AMERICAN SOCIETY FOR TESTING MATERIALS

BULLETIN

260 SOUTH BROAD STREET PHILADELPHIA, PA.

"Promotion of Knowledge of Materials of Engineering and Standardization of Specifications and Methods of Testing"

TELEPHONE—PENnypacker 3545 CABLE ADDRESS—TESTING

Number 86 April 30, 1937

Fortieth Annual Meeting at The Waldorf-Astoria, June 28-July 2

Interesting Technical Program; Other Features

With nineteen formal sessions devoted to the presentation of technical papers and reports, with the most extensive Exhibit of Testing Apparatus and Related Equipment that has yet been held, and a most interesting entertainment program, the Fortieth A.S.T.M. Annual Meeting bids fair to be the best ever held by the Society. The meeting will extend from Monday, June 28, through Friday, July 2, and throughout the five days of the meeting the Exhibit will be in progress. All sessions, committee meetings, etc., will be at The Waldorf-Astoria, New York City.

A detailed advance description of the Exhibit appearing in another portion of this BULLETIN will give an idea of the wide range of equipment and products to be displayed.

It is planned that the meeting activities will be concentrated in the various rooms located on The Waldorf's Ballroom (Third) Floor. The technical sessions are to be held in the Ballroom, and the East and West Ballroom Foyers. The A.S.T.M. Registration Desk, according to present plans, will be located in the Silver Corridor adjacent to the East Foyer and conveniently located with reference to the banks of elevators serving this floor. It is further planned to have an Assembly Room or Lounge for the convenience of the members in keeping appointments, arranging for informal conferences, etc.

FEATURES OF THE PROGRAM

Details of the nineteen technical sessions are set forth in the Provisional Program, which appears elsewhere in this BULLETIN. Careful study by the Committee on Papers and Publications, with the close cooperation of the New York Committee on Arrangements, has resulted in a set-up which eliminates evening sessions, and provides that no sessions will be scheduled on Friday afternoon, July 2. In order to provide adequate time for the sessions, there will be three simultaneous ones in progress at three periods, but in scheduling these the subjects have been so selected that there should be very little, if any, conflict of interest.

A study of the Provisional Program which gives synopses of the many technical papers and reports to be presented is of course the best way of getting a comprehensive picture of the various symposiums and of the technical program as a whole.

The formal opening session is scheduled for Monday, June 28, at 3:30 o'clock (Eastern Daylight Saving Time). The annual address by the President, A. C. Fieldner, will be given, Doctor Fieldner having selected as his subject "Fuels of Today and Tomorrow," as well as reports of certain administrative committees. A feature of this session will be the award of honorary memberships.

Another session that will be of general interest to the members is the twelfth on Wednesday afternoon at 4:15 p.m., at which the Twelfth Edgar Marburg Lecture will be delivered by Dr. T. Smith Taylor on the general subject of plastics. (Further details of the lecture are given on a later page and in the Provisional Program.) At this time also the award of the Charles B. Dudley Medal will be made to W. H. Swanger and G. F. Wohlgemuth, National Bureau of Standards, for their prize-winning paper on "Failure of Heat-Treated Steel Wire in Cables of the Mt. Hope, R. I., Suspension Bridge," presented at the 1936 annual meeting.

On Tuesday morning, the first of two sessions devoted to the Symposium on Significance of Tests of Coal and Coke is scheduled, simultaneously with the Symposium on Consistency: Critical Discussion of Present-Day Practice in Con-

A REQUEST BLANK is enclosed for Members' use in securing Preprints.

HOTEL RESERVATIONS should be made promptly

The George Washington Bridge

sistency Measurement. Each of these symposiums features a number of papers. The Coal Symposium, it will be noted, comprises seven papers by outstanding authorities and the Symposium on Consistency is made up of eleven papers covering various fields in which this subject is of importance. These symposiums are sponsored respectively by Committee D-5 on Coal and Coke and Committee E-1 on Methods of Testing.

In the afternoon, the first of two sessions devoted to the general subject of bituminous materials is listed and another of the three sessions at this time will be devoted to a Symposium on Correlation of Laboratory and Service Tests on Paints.

The sessions devoted to road materials and bituminous materials will stress a number of important subjects and problems in these fields covering asphalts, asphalt plank, weathering tests, etc.

The Symposium on Correlation of Laboratory and Service Tests on Paints has been developed by a special symposium committee of Committee D-1 on Paint, Varnish, Lacquer and Related Products, consisting of Messrs. H. A. Nelson, chairman; C. D. Holley, J. C. Moore, R. J. Moore, M. Rea Paul, and A. E. Schuh.

This is to be of an informal nature with discussions under three important topics. The committee plans to have contributions from a large number of sources, outlining applications of various procedures, with information and data on the results obtained. (See Provisional Program, Fifth Session.)

The several other sessions which will be held throughout the remainder of the week include important committee reports and numerous other technical papers, including groups of papers on water, and on cast iron. The session devoted to methods of testing is one which will be of interest to members and visitors from various fields, covering various types of tests and testing instruments. The subjects of corrosion, effect of temperature and fatigue, cement and concrete, nonferrous metals, timber and naval stores are covered in separate sessions.

During the meeting a number of round table discussions will be held. The first of these on Monday evening, June 28, will be sponsored by the American Institute of Physics on the subject of Physical Basis of Metal Properties. The suggestion for this round table conference was made by Committee E-4 on Metallography in considering its work dealing with X-ray diffraction methods. It is planned to discuss fundamental problems in an informal way, including best applications of X-ray diffraction methods. Other conferences will be sponsored by Technical Committees of E-1 on Methods of Testing including one on Monday evening on "Precision and Accuracy." The program for this contemplates papers covering fundamental aspects, and discussion of the terms from the standpoint of mechanical testing and chemical analysis. Another on Wednesday evening is on Impact Testing. Members of the Society, and others who may have interesting information in these fields, are invited to attend these informal meetings and join in the discussion.

DON'T MISS THE 1937 MEETING

Invitation from New York Committee

THE Committee on Arrangements for the 1937 Annual Meeting takes this opportunity to extend a special invitation to all members of the Society, including Junior and Student members, to attend the Fortieth Annual Meeting. It has been many years since the A.S.T.M. has had an annual meeting in New York.

The evenings are being kept free for entertainment so that you and your wife can "do New York." The Exhibit of Testing Apparatus and Related Equipment is to be the largest.

In this BULLETIN and its enclosures are details of some of the features being planned for you. The Ladies' Program will be especially interesting with many things that could be seen only in New York.

We are counting on you coming and bringing your family.

Very cordially, for the New York Committee
M. F. Skinker, *Chairman*

Skyline of Uptown New York

PREPRINTS SENT ON REQUEST

With this BULLETIN there is enclosed to each A.S.T.M. member in good standing a preprint request blank by which he can request a copy of any of the technical papers and reports preprinted in advance of the meeting. This blank should be returned promptly and should be carefully marked, with the signature and mailing address of the member clearly indicated. The Provisional Program will enable members to make a selection of the items desired. Preprints will be forwarded to the members, probably in three installments. *Each member should note that preprints will not be sent unless requested.*

COMMITTEE ON ARRANGEMENTS

The New York Committee on Arrangements for the annual meeting has taken a very active part in the planning of the various features. Numerous meetings have been held by the various subgroups responsible for specific parts of the meeting and the coordination of the various activities has been handled under the direction of Dr. M. F. Skinker, Brooklyn Edison Co., Chairman of the New York Committee, with the cooperation of the chairmen of the respective groups as given below.

COMMITTEE ON ANNUAL MEETING ARRANGEMENTS

Honorary Chairman, H. S. Vassar, Public Service Electric and Gas Co.
Chairman, M. F. Skinker, Brooklyn Edison Co.
Vice-Chairman, W. H. Finkeldey, Singmaster & Breyer.
Secretary, G. O. Hiers, National Lead Co.

SUBCOMMITTEES AND CHAIRMEN

Ladies Committee—Mrs. William H. Bassett, Jr.
Entertainment Committee—J. R. Townsend, Bell Telephone Labs, Inc.
Program Committee—R. L. Hallett, National Lead Co.
Finance Committee—K. G. Mackenzie, The Texas Company.
Publicity Committee—E. A. Snyder, Socony-Vacuum Oil Co., Inc.
Exhibit Committee—F. M. Farmer, Electrical Testing Labs.
Membership Committee—J. M. Weiss, Weiss & Downs, Inc.

In addition to the above, the following are members of the general committee:

D. A. Abrams, Consulting Engineer
W. H. Bassett, Jr., Anaconda Wire and Cable Co.
L. C. Beard, Jr., Socony-Vacuum Oil Co., Inc.
R. L. Bertin, White Construction Co.
C. M. Chapman, Consulting Engineer
M. P. Davis, Otis Elevator Co.
D. E. Douty, United States Testing Co., Inc.
Harry Frecker, Jr., New York Belting and Packing Co.
J. V. Freeman, U. S. Steel Corp.
C. R. Ince, St. Joseph Lead Co.
H. J. Jaquith, Minot, Hooper and Co.
Lester Kirschbraun, The Flintkote Corp.
C. A. Lunn, Consolidated Edison Co. of N. Y.
C. E. MacQuigg, Union Carbide and Carbon Research Laboratories, Inc.
R. J. McKay, The International Nickel Co.
J. Strother Miller, Jr., The Barber Asphalt Co.
L. F. Rader, Polytechnic Institute of Brooklyn
J. B. Rather, Socony-Vacuum Oil Co., Inc.
C. S. Reeve, The Barrett Co.
Allen Rogers, Pratt Institute
J. McE. Sanderson, American Cyanamid Co.
W. G. Schneider, The American Brass Co.
Maximilian Toch, Toch Bros., Inc.
J. R. Townsend, Bell Telephone Laboratories, Inc.
R. M. Wilhelm, C. J. Tagliabue Manufacturing Co.
L. T. Work, Columbia University
T. A. Wright, Lucius Pitkin, Inc.

One of the major activities has been the development of an outstanding Ladies' Entertainment Program under the direction of the Ladies' Committee headed by Mrs. W. H. Bassett, Jr.

ENTERTAINMENT PROGRAM

Enclosed with this BULLETIN to each member of the Society is a special folder outlining the numerous features comprising the Ladies' Entertainment Program. It will be noted that this includes trips to Rockefeller Center, the broadcasting studios, a visit to one of the world's largest liners, Bellevue Hospital, Frick Museum of Art, Crescent Athletic Club at Huntington, L. I., and Hayden Planetarium. A luncheon and bridge is also planned.

Except for certain designated items there is to be no charge to the ladies for the entertainment, the necessary costs being taken care of by a special fund raised by the New York Committee.

The usual arrangements for the Golf Tournament are being made, as indicated below, and in addition the New York Committee is featuring a visit to the Hayden Planetarium which will be made available without charge to the men as well as the ladies. This is a special showing, as outlined in the ladies' entertainment folder, and the New York Committee hopes that there will be a general participation on the part of those attending the meeting. If any of the men are interested in having reservations made for theatre tickets, this should be indicated on the enclosed Ladies' Advance Registration Card.

In view of the rather elaborate arrangements that have been made, the New York Committee must have advance knowledge as to the number of ladies planning to attend the meeting. It is accordingly requested that all those

Henry Hudson Memorial Span—Largest Hingeless Single-arch Span in the World

Grand Central Parkway—Queens—Showing Roadway, Planting Areas, and Retaining Walls

who plan to be present fill in the ladies' advance registration card and forward it as promptly as possible in the accompanying envelope addressed to Doctor Skinker.

The headquarters for Ladies' Registration will be adjacent to the Sert Room on the Lobby floor. Members of the Ladies' Committee will be on duty there during the meeting.

GOLF TOURNAMENT

The annual A.S.T.M. golf tournament will be held at the Crescent Athletic Club, Huntington, L. I., on Thursday afternoon, July 1. Huntington is about 36 miles from The Waldorf-Astoria and the committee in charge, headed by R. L. Hallett, has planned to arrange transportation by bus for those who are not going in private cars. There will be no charge for bus transportation, the cost being assumed by the New York Committee on Arrangements.

The customary fee of $5 will be charged. This will include green's fee and luncheon. A number of prizes are to be awarded including of course the A.S.T.M. Golf Cup. Further details of the tournament will be given in a circular letter going to the members late in May.

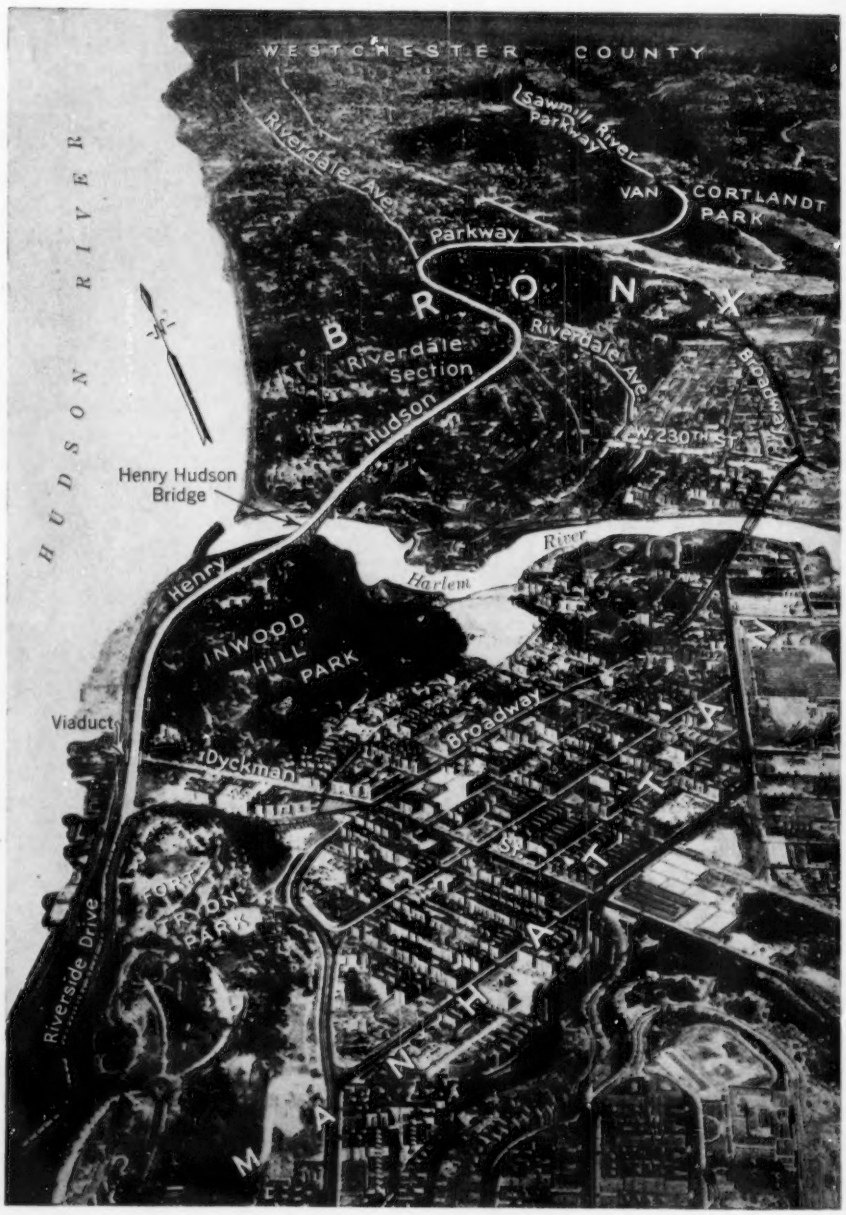
REGISTRATION PROCEDURE

Members and visitors should register at the A.S.T.M. desk as promptly as possible after their arrival at the hotel. Each member will receive his badge, a copy of the final program, and directory exhibits and preprints of any of the papers and reports desired. The customary members' registration fee of $1 will be in effect. Visitors will receive the badge, program and may secure preprints for any two sessions of the meeting. The visitors' fee is $1, but if a complete set of preprints is desired they may be procured by the payment of $1 additional.

HOTEL RESERVATIONS AND ADVANCE REGISTRATION

The Waldorf-Astoria is extending special reduced rates to members of the Society and it is desirable that hotel reservations be made promptly. For this purpose a return card, addressed to the hotel management, is enclosed with this BULLETIN. Some of the members may wish to stay at other hotels in New York and, in this case, it is presumed that they will make reservations direct with the respective hotel managements.

In order to expedite registration of members as they arrive at the meeting, it is desirable to have as many registration details as possible taken care of in advance and it will be very helpful if members will fill out and mail promptly to Society Headquarters the enclosed advance registration card.



Aerial View of Henry Hudson Parkway

T. Smith Taylor—Marburg Lecturer

THE Twelfth Edgar Marburg Lecture will be delivered at the 1937 (Fortieth) A.S.T.M. Annual Meeting at The Waldorf-Astoria in New York City by Dr. T. Smith Taylor, Professor of Physics, Washington and Jefferson College. The subject of the lecture will be "Plastics: Some Applications of Different Classes, Methods of Testing," including discussion of the suitability of various types of plastics for their more extensive applications. Special consideration will be given to the various test methods applicable to plastics. In general the lecture will cover in an authoritative and interesting way some of the rapid developments in the plastics field.

T. Smith Taylor

Doctor Taylor was born in Peoli, Ohio. After receiving his A.B. degree from Yale in 1906 and his Ph.D. degree in 1909, he was Instructor, University of Illinois, 1909 to 1912; Research Fellow at the University of Manchester, England; and then Instructor and Assistant Professor of Physics at Yale, 1913 to 1917.

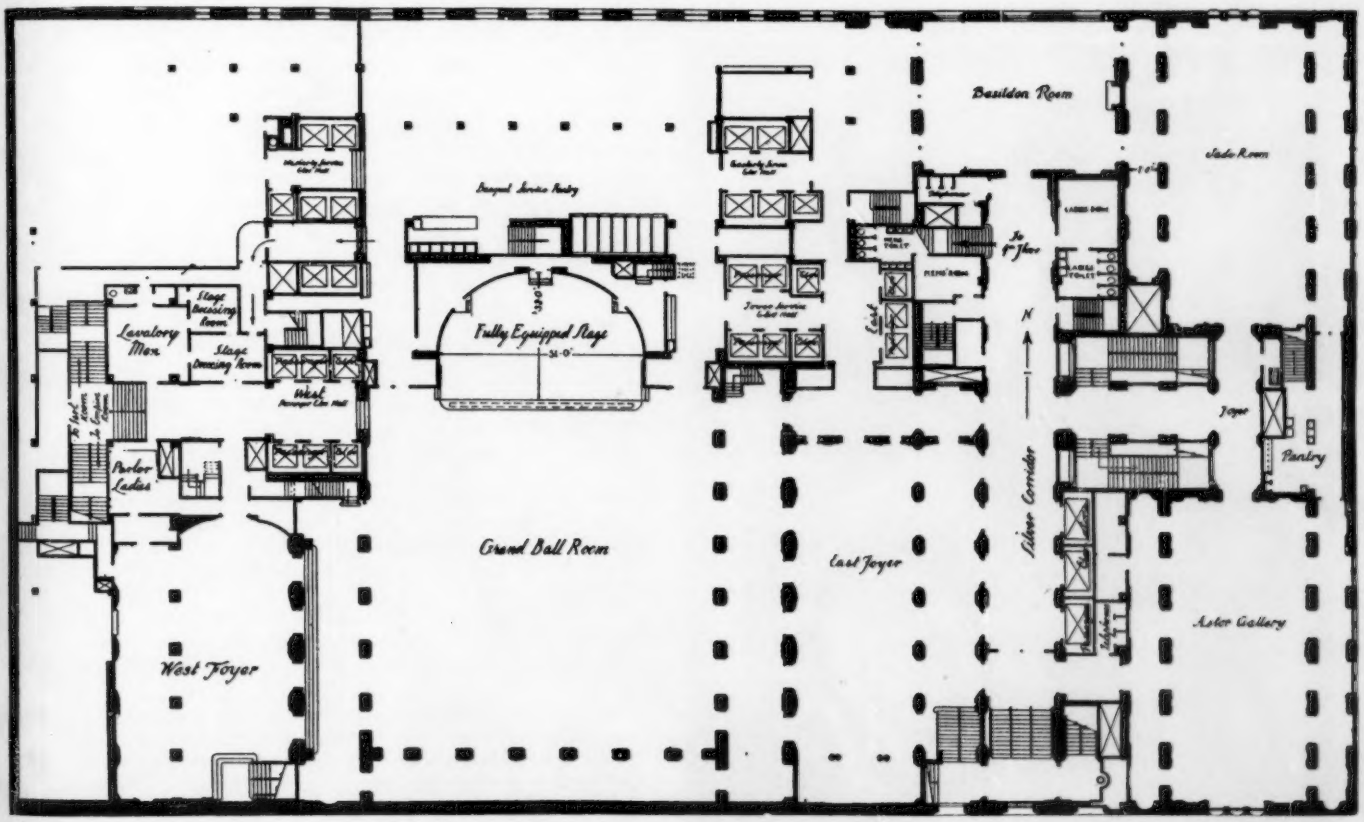
Following his service as Research Physicist, Westinghouse Electric and Manufacturing Co., 1917 to 1924, he became Chief Research Physicist of the Bakelite Corp. In 1933 he established a consulting practice and the following year was appointed Professor of Physics at Washington and Jefferson College.

Doctor Taylor has written numerous articles dealing with heat transfer, thermal conductivity and allied phenomena, radioactive phenomena and properties of alpha rays, determination of the density of helium, etc.

He is a member of several technical and scientific societies including the American Association for the Advancement of Science, American Physical Society, American Institute of Electrical Engineers, Sigma Xi and Phi Beta Kappa. Doctor Taylor has been a member of A.S.T.M. since 1924. From 1926 to 1930 he was secretary of Committee D-9 on Electrical Insulating Materials and is at present chairman of this committee, having served since 1934.

Plan of Ballroom (Third) Floor, The Waldorf-Astoria, showing Various Rooms to be Used for the Technical Sessions, Exhibit, etc.

50th Street



49th Street

Technical Sessions will be in the Grand Ballroom, East and West Foyers. Exhibit to be in Jade Room, Astor Gallery and Basildon Room. Lexington Avenue is at the right, along the Jade R oom and Astor Gallery; Park Avenue at left.

Oscar of The Waldorf

"I AM more than pleased to welcome the members of the American Society for Testing Materials on the occasion of their first convention at The Waldorf-Astoria. The comfort of each individual will be my personal concern, and the success of the gathering my most earnest desire.

"It is with all sincerity I say that I hope I may have the pleasure of seeing you and the honor of serving your Society here at The Waldorf for many years to come."

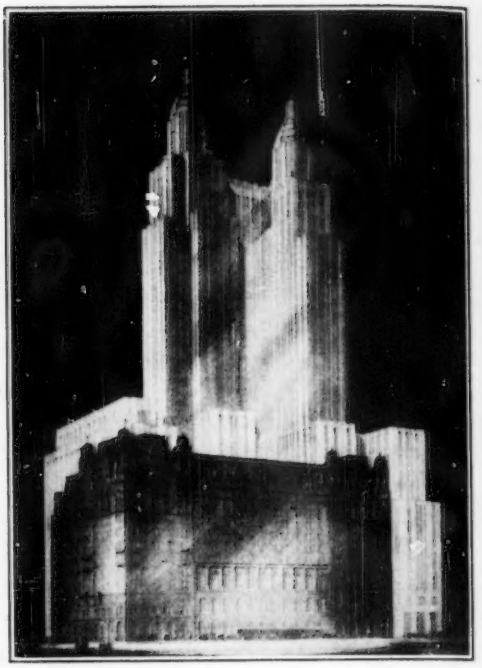
OSCAR OF THE WALDORF

There is no more famous name in the hotel business of the world than "Oscar of The Waldorf." For most of his business life he has been intimately identified with The Waldorf-Astoria, both the old Waldorf and the new. He was born in Switzerland in 1866, where he attended school. His first positions were in confectionery and pastry establishments.

He landed in America in May, 1885, the day before the opening of the Brooklyn Bridge. At five o'clock on the same day he had obtained a position at the old Hoffman House, at Twenty-sixth St. and Broadway, then one of America's most famous hostelries. Mr. Stokes, proprietor of the Hoffman House, frequently placed Oscar in charge of provisioning and staffing his yacht, and he had charge also of numerous private parties. He served in the receiving department as a steward, he was a checker, he studied bookkeeping, and in particular, catering which appealed so much to him.

After several years he transferred to Delmonico's and was promoted to catering manager. When George Boldt, proprietor of the first Waldorf which was to be opened in 1893, asked for letters of reference, Oscar produced a letter of recommendation that covered ten pages. It was signed by many famous New Yorkers and Oscar was given charge of the restaurants and great catering business of the hotel. Oscar has acted as host to the guests of The Waldorf, both old and new, for over forty years, and has welcomed many world famous guests. He has greeted every President of the United States, commencing with President Cleveland. It is interesting to note that he has been decorated by three governments—Roumania, France, and Belgium.

Oscar and Mrs. Tschirky celebrated their forty-ninth wedding anniversary on September 18, 1936, and Oscar his seventieth birthday ten days later.



The Old Waldorf Superimposed on the New

I Like Discussions

I like discussions. The name doesn't matter much—forum, panel discussion, round table—though "seminar" sounds the least bit stuffy, like going into a long-closed schoolroom.

I like discussions, as much for what they disturb as for what they settle.

I like them because, by studying the differences of opinion they produce, I can tell whether a person is thinking or, in the old phrase, is only rearranging his prejudices.

I like discussions because differences of opinion are interesting for their own sakes.

I like discussions not only because I have no quarrel with differences, but because they may save me from quarrels with people.

I like discussions because they help me to tolerate opinions that I can't accept.

I like discussions because they force me to face new facts and arguments which might weaken my own case.

I like discussions because they save me from being too sure of those notions of mine that are supported by too few facts or too thin argument.

I like discussions because they give me a chance—which I greatly enjoy—of trying to state the other man's case even more persuasively than he does.

Justus Timberline

Extensive Exhibit of Testing Apparatus and Related Equipment to be Held

Leading Companies in the Scientific Apparatus and Laboratory Supply Field Will Take Part; Interesting Research Exhibits to be Sponsored

THE Fourth Exhibit of Testing Apparatus and Related Equipment which will be in progress at the Waldorf-Astoria, New York City, in connection with the annual meeting of the Society, extending from Monday, June 28, through Friday, July 2, will be the largest and most interesting that has yet been sponsored by the Society. Many of the leading commercial companies engaged in the manufacture and distribution of testing apparatus and related equipment, measuring and recording instruments, and laboratory supplies, etc., will display their products, and a number of research displays sponsored by A.S.T.M. committees and certain research laboratories will be included.

The Exhibit will occupy three rooms on The Waldorf's Ballroom Floor. It will be open morning and afternoon of each day and the tentative plans provide for it to be in progress on Monday and Wednesday evenings.

The industrial displays will include testing and research equipment used in connection with all types of materials. It will be noted from the brief descriptions of some of the interesting items to be exhibited by the respective organizations, as given below, that the apparatus and instruments include latest developments involving universal testing machines, metallographic and spectrographic equipment, microscopes and other types of optical instruments, scientific glassware of all kinds, instruments used in connection with textile materials, calorimeters, petroleum apparatus, accelerated weathering instruments, wear testing devices, gages, and a host of others. These displays will give members and the large number of visitors who will attend the Exhibit an idea of the remarkable progress made in the industry and the wide range of instruments available for all types of test and research work and will include a large number of instruments which are covered by specifications and tests issued by the Society.

A number of standing committees of the Society will participate. Committee and research displays have been among the outstanding features of previous exhibits and those in the 1937 Exhibit will be of widespread interest.

In the A.S.T.M. booth will be a complete display of the extensive A.S.T.M. publications, and charts giving information about various phases of A.S.T.M. work, and literature will be available for distribution to anyone interested in the various fields involved in the Society's standardization and research activities.

The following list and descriptions are not necessarily complete since it is expected that a number of additional booth displays will be included in the final setup.

Committee A-5 on Corrosion of Iron and Steel

Committee A-5 in cooperation with other A.S.T.M. committees which have corrosion test programs under way, including B-3 on Corrosion of Non-Ferrous Metals and Alloys, B-6 on Die-Cast Metals and Alloys, and D-14 on Screen Wire Cloth, is preparing a large size wall map of the United States on which will be located the test sites at which outdoor and related corrosion tests are under way or have been recently completed. Condensed information will be given on the map and this portion of the display will be supplemented by a number of photographs of the various test sites, especially the wire test fields where the corrosion tests on wire and wire fence have been recently started. Test racks and test specimens duplicating those used in the extensive corrosion tests sponsored under Society auspices will be exhibited. The general theme of the exhibit is to stress the extent of the corrosion work being carried on by the respective Society committees and to indicate the comprehensive and valuable data which have resulted, and which will develop as the tests continue.

Committee E-4 on Metallography

Committee E-4 is planning an exhibit of photomicrographs, radiographs and X-ray photograms to illustrate the fields of work in which the committee is active. The display is being planned to illustrate the results which can be obtained by the use of practices recommended by the Society as well as demonstrating the breadth of the Society's activities in the fields of metallography and X-ray radiography and crystallography.

Joint Research Committee on Effect of Temperature on the Properties of Metals

The extensive exhibit being developed by the joint research committee will be along the following lines: Photographic display of equipment for high and low temperature research in several cooperating laboratories, including typical test specimens; behavior of typical steels and non-ferrous alloys in short-time tension, creep and impact at high and low temperatures, including cooperative test results on the same steel tested in several laboratories; the effect of time, temperature and stress on structural stability at elevated temperatures, illustrated with photomicrographs; studies in galling and seizing; and new projects under way with list of sponsors.

Committee D-9 on Electrical Insulating Materials

Included in the several items which Committee D-9 will have on display will be equipment recently developed for the measurement of flow of shellac. This test is made for the purpose of determining whether shellac will be suitable for impregnating electrical insulation. The instrument has been developed recently by the Subcommittee on Insulating Varnishes, Paints and Lacquers, and the requirements will be incorporated in the standards in the charge of the committee. The committee hopes that a special power factor cell will be available for display. The committee plans to use this instrument for investigation work in the measurement of power factor of insulating and cable oils. A new development in machinist's micrometers permitting ready adjustment of the micrometer pressure may be shown.

List of Companies in Instruments and Related Fields, with Brief Notes on Displays

Ace Glass, Incorporated — Vineland, N. J.

Latest developments in laboratory glass apparatus will be exhibited by this company which has designed and produced many new items to meet modern laboratory requirements. Greater mechanical strength and uniformity has been incorporated in all Ace interchangeable glassware fabricated by new methods of production developed by their engineers. The exhibit will include a complete line of glassware for petroleum research and control laboratories, featuring ACE Graduated Ware.

American Instrument Co., Inc. — Silver Springs, Md.

The booth display sponsored by this company includes oil testing instruments and other A.S.T.M. testing devices. A feature of the display will be a new photoelectric photometer with accessories. For the convenience of customers who wish to discuss design problems, a designing engineer will be present in the booth at all times.

Amthor Testing Instrument Co., Inc. — Brooklyn, N. Y.

This display will include a vertical type universal tester with variable motor speeds and different set of clamps for paper, cordage, rubber, rubber-tape and light copper wire; horizontal type tensile strength tester for leather and heavy twine, maximum capacity 1500 lb.; a new computing scale for production control of basis weight and moisture determination; duplex model paper folding endurance tester; stationary and hand tachom-

eters; speed indicators; various paper and cordage scales; and pocket and desk model paper micrometers.

ATLAS ELECTRIC DEVICES CO. Chicago, Ill.

Display of latest model Weather-Ometer, Fade-Ometer and Launder-Ometer, all recognized accelerated testing devices in their respective fields, with examples of typical applications and illustrations of the variety of uses to which they are put in control, development and research laboratories. Used internationally, this equipment has become during the past eighteen years, the universally accepted "yard-stick," independent of time, place and climatic conditions.

BALDWIN-SOUTHWARK CORP. Philadelphia, Pa.

New developments include a Tate-Emery 24 in. Multi-Range Dial (on a 60,000 lb. Universal Testing Machine) driving its own recorder. Loading scales can be changed without stopping the machine. Other instruments are an improved Carpenter torsion impact and a Bernhard mechanical oscillator which applies rapidly repeated stress to full size structures. The de Forest-Raytheon fatigue machine for specimens in full section without machining and the new R. R. Moore high-speed rotating-beam fatigue machine for standard size machined specimens at 10,000 r.p.m. will be shown.

BAUSCH & LOMB OPTICAL CO. Rochester, N. Y.

This display will include various optical instruments used in carrying out A.S.T.M. standard and tentative methods of test and analyses. It will show microscopes especially adapted for metallographic work, for the examination and measurement of textile fibers and fabrics, and for work on the particle sizes of fine pigments. There will also be a quartz spectrograph suitable for the analysis of zinc-base die-casting alloys to insure their compliance with standard specifications.

CHRISTIAN BECKER, INC. New York City

Dial Reading Chainomatic Balances met with instant approval following their introduction at the Exposition of Chemical Industries held in December, 1935. Readings are made at constant eye level, parallax is reduced to a minimum. Several of the more popular models will be on display. Representatives will be pleased to discuss particular requirements and weighing problems and the development of special balances to meet specific needs.

E. E. W. BOWEN & COMPANY Bethesda, Md.

This company will exhibit the Wagner Turbidimeter with an improved photronic cell. Other cement testing apparatus will include the modified Wagner Turbidimeter for SO_3 determinations, the cabinet calorimeter for determining heat of hydration, the expansible cube mold, and the Rogers porous plate suction apparatus for determining water retaining capacity of mortars. A Hazeometer for measuring the scattering of light in clear plastics, and the McBurney-Bowen indentation tester for measuring plastic deformation in flooring materials will be included.

CAMBRIDGE INSTRUMENT CO. New York City

CENTRAL SCIENTIFIC CO. Chicago, Ill.

In the booth display to be sponsored by this company there will be featured a number of new developments in laboratory apparatus and scientific instruments which will be of interest to many of the A.S.T.M. members and others attending the Exhibit from the various materials fields.

EIMER & AMEND, INC. New York City

Included in this display will be apparatus according to the specifications of the American Society for Testing Materials, particularly as applied to asphalt, cement, coal, oil and varnish testing. Many of the instruments to be shown are made in their own glass blowing and instrument shops. Visitors to New York are invited also to visit the showrooms of this company which extend from 18th to 19th Street on Third Avenue.

EMERSON APPARATUS CO. Melrose, Mass.

This display consists of their regular lines of apparatus including conditioning ovens, accelerated rubber aging apparatus, rubber buffing machines, and the Emerson fuel calorimeter. The accelerated rubber aging apparatus includes the new type combination Bierer-Davis oxygen aging and air aging outfits. There are two types of apparatus in this exhibit offering means for the above combination testing. They are the new type circulating jacket and the steam heated units.

FEDERAL PNEUMATIC SYSTEMS, INC. Chicago, Ill.

This company will exhibit the widely used Laboratory Air Classifier for dividing material according to particle size. The device fractionates material of uniform density to five micron dimension, and is of valuable service in the classification of pulverized rare metals. Manifestly sharp mesh cleavage, the usual objective, is directly related to the physical characteristics of the material. Smaller units are adapted to diamond dust and larger units, with porcelain lining, to chemicals.

FEDERAL PRODUCTS CORP. Providence, R. I.

One of the most important factors to consider after a definite standard has been established is the control of that standard. A primary object of the A.S.T.M. is to establish certain limits on materials so that different manufacturers and buyers can talk the same language and mean the same thing when buying and selling materials. This purpose is bound to lose its value, however, if the standards set up cannot be maintained and protected in production. This company will exhibit various Dial Indicators and Gages used by textile, paper, rubber, electrical, mechanical, and other industries for checking and controlling production to the physical dimensions specified.

GENERAL RADIO CO. Cambridge, Mass.

The exhibit of this company will feature two types of capacitance and power factor bridge. The recently developed Type 716-A Capacitance Bridge is a self contained instrument, direct reading power factor and capacitance. The normal operating frequency range—60 cycles to 5 megacycles. Resistance, inductance, capacitance and power factor may be measured. Resistance boxes and standard condensers will also be shown.

GREAT WESTERN MANUFACTURING CO. Leavenworth, Kan.

This company will present for the first time at the A.S.T.M. Exhibit their gyratory laboratory testing sifter. This machine has a four inch circle of gyration, but can furnish other circles of gyration. It operates with fractional horsepower motor—noiseless, smooth-running and dust-proof. Speed, 180 r.p.m. The sifter operates with six sieves, each with one square foot free bolting surface, and spacer and cover.

THE EMIL GREINER CO. New York City

There will be featured in this display a fully automatic mechanically refrigerated cloud and pour test Apparatus for petroleum oils. This instrument will have several newly incorporated improvements. Also included in the exhibit will be an improved type of Constant Temperature Bath for the modified Ostwald Viscosimeter, recently proposed by the A.S.T.M. Committee D-2 on Petroleum Products and Lubricants.

ILLINOIS TESTING LABS., INC. Chicago, Ill.

A complete line of indicating pyrometers both portable and wall type, single and multi point including the combination Pyrocon for surface temperature measurements will be featured. The display will include portable and wall type distant reading thermometers resistance type for all low temperature applications. The "Alnor" Velometer, and instantaneous direct reading air velocity meter with various attachments and the new "Alnor" Pyrometer Controller which operates on the electronic principle are to be shown.

INSTRUMENTS PUBLISHING CO., Pittsburgh, Pa.

In this booth will be displayed the journal *Instruments*, "The Magazine of Measurement and Control," and numerous books on such topics as the following: How to Find Metallurgical Information; Fundamentals of Instrumentation; Symposium on Illumination; Materials Testing Machines; Electrical Measurements; Photo-Electric and Selenium Cells; Mercury Arc Rectifier Practice; Cathode Ray Oscillography; and others.

LEEDS & NORTHRUP CO. Philadelphia, Pa.

Instruments for testing electrical properties of materials will be shown, including the Schering Bridge for power factor and specific inductive capacitance of liquid or solid insulating material; guarded test set measuring insulation resistance under all atmospheric conditions; the Wenner potentiometer which measures temperature extremely accurately, and Micromax electric control, consisting of recording controller, relay element, motor-driven valve and Rayotube detector, regulates temperature by proportioning input to demand. Representative equipment for pH measurements will be shown also.

E. LEITZ, INC. New York City

Among the many pieces of scientific apparatus to be exhibited are the following instruments: A workshop measuring microscope of unusual versatility and accuracy; photometer equipment for determining the contents of dust in the air; universal photomicrographic apparatus with permanently aligned illumination system for every conceivable task in photomicrography and photomacrography; and many auxiliary devices for microscopy in affiliated sciences.

"METALS AND ALLOYS" — New York City

Copies of *Metals and Alloys*, "The Magazine of Metallurgical Engineering," will be exhibited and there will be shown a large number of technical and engineering books pertaining to the testing of materials and related subjects of interest to members of the Society and others visiting the Exhibit.

NATIONAL CARBON CO., INC. — Cleveland, Ohio

The new "Eveready" Accelerated Testing Unit Model X-1, a complete unit for accelerated testing of paints, lacquers, varnishes and other products using a high-powered arc source will be demonstrated in full operation. In addition the company will demonstrate the new "Eveready" Fluoray Lamp for fluorescent analysis and there will be a complete exhibit of arc carbons designed especially for spectroscopic analysis.

TINIUS OLSEN TESTING MACHINE CO. — Philadelphia, Pa.

The keynote of this display will be a new design universal testing machine. The machine will have a maximum capacity of 50,000 lb., and three additional ranges down to 5000 lb. Operation of the machine is hydraulic, weighing is hydraulic, indicating by pendulum and dial. The new Olsen all electrical high magnification recorder will be shown in operation with the machine. Several other pieces including the Los Angeles abrasion machine, the motor driven Tour-Marshall stiffness tester, verifying ring, and extensometer will also be featured.

PALO MYERS, INC. — New York City

PARR INSTRUMENT CO. — Moline, Ill.

The latest model oxygen bomb calorimeter of the adiabatic type is expected to be displayed. The apparatus can be completely dismantled on the spot to show its many interesting features. These are purposely designed for the A.S.T.M. procedures covering laboratory sampling and analysis of coal and coke (D 271) and tests for sulfur in petroleum oils (D 129). Thus the unit is especially well adapted to the determination of thermal values and sulfur in coal, coke and oils. A chemist well versed in the operation of the instrument will be on hand.

PHILIPS METALIX CORP. — Mount Vernon, N. Y.

The new Crystal Analysis Unit for material examination by X-ray diffraction methods will be exhibited. Unique in design, this is indicated as the only ray-protected, shockproof, air-cooled, completely self-contained equipment manufactured. It incorporates automatic safeguards against tube destruction and employs any one of five easily interchangeable tubes (tungsten, molybdenum, cobalt, iron, or copper anodes) providing two simultaneous exposures. In addition, the Philips display will include fine structure ray-protected tubes with four windows.

PODBIELNIAK INDUSTRIAL RESEARCH AND ENGINEERING LABORATORIES. — Chicago, Ill.

The following will be demonstrated: Model "A" low-temperature, manually controlled, gas fractionation analysis apparatus; Model "L," "Robot" model similar to Model "A" but automatically controlled, self-recording and more precise; Model "B," vacuum jacket type, high-temperature fractionating apparatus; "Organic" centrifugal fractionator of 100 plates efficiency and special No. 1400 centrifugal fractionator over 200 plates efficiency and distilling up to 400 cc. per minute reflux plus product; No. 6050 centrifugal continuous counter current automatic pilot solvent extracting plant. Circulars, charts, etc., available on other apparatus and services.

PRECISION SCIENTIFIC CO. — Chicago, Ill.

Display is built around their own manufactured products of specific interest to A.S.T.M. members—covering apparatus for testing cement, lime, gypsum, soils, and an extensive range of petroleum products. There will be recently developed laboratory items of general utility such as the Ful-Kontrol electric laboratory heater, and the Midget water still, producing one quart per hour. Metallurgical specimens will show the step-by-step process in forging "Precision" cement molds and Cleveland flash cups.

RADIUM CHEMICAL CO., INC. — New York City

This company will display radiographs taken with radium. They will also display radium containers; shipping containers and the representatives in attendance at the booth will be pleased to discuss with visitors the method by which radium may be obtained for radiography.

RIEHLE TESTING MACHINE DIVISION, AMERICAN MACHINE AND METALS, INC. — New York City

Four of their popular machines will be displayed including the 60,000 lb. Riehle precision hydraulic universal testing machine and the 40,000 lb. Tru-Gauge hydraulic universal, which is used in foundries, etc., for general tensile, compression and transverse testing. There will also be shown the Vickers pyramid diamond hardness tester, a favorite in the country's leading research departments, and the new Riehle "VV" Variable Velocity impact tester.

GEORGE SCHERR CO. — New York City

Optical instruments for measuring and inspecting tools, taps, screws and similar work; also instruments for producing or checking circular divisions, gears, etc., will be featured. A new comparison microscope will be demonstrated for comparison of the finish of two surfaces, whereby the image of both are observed alongside each other in one common eyepiece. This instrument is also used for examining grain structure of metals—the specimen is directly compared with a previously prepared standard set of various grain sizes.

SCIENTIFIC GLASS APPARATUS CO. — Bloomfield, N. J.

A number of new and interesting items will be found on display including the new tool-made joints of interchangeable ground glass, emphasizing the uniform walls and added strength. Silver, gold, and platinum plated joints built into newly designed distilling apparatus, plus a greaseless stopcock and greaseless joint will also be on display. The Exton universal scopometer, the new Hellige pH meter, and many new micro set-ups will be included. Other items are to be featured.

HENRY L. SCOTT CO. — Providence, R. I.

Several types of tensile strength testing machines will be shown. The display consists not only of the conventional pendulum type machines, but also the new incline plane principle. The table model of incline plane machine, for extremely light stress-strain work, is delicate enough to test human hair. The pendulum type rubber tester computes the tensile strength of rubber samples from pounds pull to tensile per square inch direct from the machine record.

SHAWMUT ENGINEERING CO. — Boston, Mass.

THE STANDARD ELECTRIC TIME CO. — Springfield, Mass.

Special timing apparatus will be featured. Synchronous operated electric stopclocks measuring intervals to 1/200th seconds and a cycle counter for high speed relay testing will be demonstrated. The chrono-tachometer, which integrates revolutions and time, combined with a tachometer will interest engine manufacturers. The laboratory time standard, arranged for electronic impulsing and timing with great precision, will be shown.

ALFRED SUTER — New York City

C. J. TAGLIABUE MANUFACTURING CO. — Brooklyn, N. Y.

The more recent developments in oil testing instruments and a graphical demonstration of operations in making accurate A.S.T.M. etched stem thermometers and hydrometers will be shown. A new development in hydrometer design will be featured for the first time. Latest developments in pressure spring instruments including recorders, recorder-controllers and indicating controllers for temperature and pressure will also be featured and also the line of TAG Celectray photoelectrically balanced potentiometer pyrometers. The new TAG Celectray high speed multiple point recorder which utilizes a photoelectric tube, mirror galvanometer and beam of light will be in operation.

TESTING MACHINES, INC. — New York City

In this display will be exhibited various types of Schopper testing machines such as the new variable speed drive tensile strength and elongation tester, impact tester, Naumann-Schopper bending tester and the new Schopper Dunstat testing machine for determining dynamic and statical bending strengths of hard rubber, plastics, etc.

WILSON MECHANICAL INSTRUMENT CO., INC. — New York City

In this booth will be exhibited the "Rockwell" Hardness Tester, "Rockwell" Superficial Hardness Tester, and accessories in practical operation. Both type machines will be set up for demonstration purposes. Those interested in the new possibilities of testing sheet metal or other thin or small work may bring specimens for tests on the "Rockwell" Superficial Tester which is now being used by practically every steel, brass and bronze mill in the country where sheet and strip is rolled, and by those producing parts from thin material.

CARL ZEISS, INC. — New York City

This company will show a new spectrographic equipment especially designed for quantitative analysis in industrial laboratories, consisting of Spectrograph Qu 24, Feussner sparking apparatus, spectrum line photometer, and spectrum line projector. The equipment combines high sensitivity with simplicity in handling and rugged construction. Other exhibits include the metallographs Neophot and Metalliput, refractometers, photometers, and microscopes.

Federal Specifications Prepared Under the Direction of the Federal Specifications Executive Committee

by N. F. Harriman[1]

EDITOR'S NOTE.—Believing that many of the members would find of interest a discussion on the preparation of Federal specifications, Mr. Harriman was asked if he would contribute a paper. He has done so and the excellent paper follows.

Mr. Harriman received his technical education at the University of Michigan, B.S. degree. He was Engineer of Tests, Union Pacific Railroad, 1902 to 1921, then Senior Engineer-Physicist, National Bureau of Standards. He was Vice-Chairman, Federal Specifications Board, 1921 to 1928; Executive Chairman, Federal Purchasing Board and Assistant to Chief Coordinator, Bureau of the Budget, 1928 to 1931. 1931 to date, Vice-Chairman, Federal Specifications Executive Committee; also Technical Assistant to Assistant Director of Procurement, Treasury Department, 1935 to date. He has been a member of the Society since 1902.

WITHIN recent years the development of industry has resulted in a large increase in the number of types, grades, sizes, etc., of material, supplies, and equipment, which are produced to meet modern desires or needs, and greater demands are being made upon them than ever before. Purchaser and user are continually calling for lower prices and greater efficiency of these articles; therefore, the importance of standards of quality, or specifications, is obvious.

A *standard* may be concisely defined as a criterion, measure, or example of procedure, process, design, dimension, extent, quality, quantity, performance, or value, which has been established by authority, custom, or general consent, as a definite basis of reference or comparison.

A *standard of quality* is a carefully drawn description covering the characteristics of a material, some supply article, or a piece of equipment, and should cover all of the points of variation which it is desirable to consider at the time the standard is adopted.

Such standards of quality are termed "specifications," and they are of especial importance from the standpoint of the purchaser, vendor, and user of commodities, inasmuch as the best and most economical way to get the desired quality of an article is by the use of proper and adequate specifications. Specifications should always be subject to revision, so that they will conform to advances in the arts of production or to changes in the requirements of the user.

The object of a purchase specification is to inform the vendor as to what the purchaser wants and what he does not want; that is, to define desired quality, with proper tolerances. Quality, in the sense here used, is that characteristic, or combination of characteristics, which makes a product suitable for a given use. In other words, a product is not simply "good," it is good for a particular purpose, and in defining the quality of an article, the intended use of that article should be kept in mind.

The quality of a commodity, then, depends upon a number of related characteristics, such as design, dimensions, composition, strength, workmanship, finish, adjustment, performance, etc. Some of these characteristics are capable of measurement and numerical expression while others are not. The descriptions of the dominant qualities should be definite and concise, so that there will be understood just what the product is intended to be.

It is a basic principle of purchasing that competition reacts to the benefit of the purchaser. If competition is to be secured and maintained, there must be a clear statement of requirements in a specification, so that bids may be made intelligently and under uniform conditions for all bidders. Without purchase specifications the reputable bidder is not only at the mercy of the unscrupulous one, but the purchaser is deprived of the legitimate economy resulting from this method of purchasing.

To set the standard of a specification too low results in losses and low efficiency; to set it too high may make the cost excessive. The article must be strictly suitable for the purpose intended, due consideration being given to its net utility.

That quality of products is fundamental has been conclusively demonstrated. Test one by one the elements of satisfaction in a purchase and it will be found that prices, terms, and conditions of delivery, lose their appeal if quality is not as agreed upon, either orally or written in a specification.

SPECIFICATION ESSENTIALS

Specifications should be written to cover commercial products, as far as practicable. A special product is expensive and often unnecessary. One of the most important things to guard against in the formulation of a specification is the tendency to include characteristics that are not essential to the uses to which the article will be put.

A properly drawn specification is a high order of work and its formulation requires the services of the technologist and engineer for technical details, the purchasing agent for commercial details, and the lawyer for the legal details, which is very important, as a specification is a part of a contract, either directly or by citation. The chemist and testing engineer should be consulted for the test and inspection methods, and, in addition, the views of the practical user of the material should be considered. Of course, the producer should be consulted to eliminate specifying proprietary articles, and to ensure that competition can be obtained.

Specifications should include the methods to be used for determining whether the specified characteristics, such as chemical composition, physical properties, dimensions, finish, etc., have been complied with.

Much time and painstaking care are required to formulate a purchase specification that will stand the test of use.

It is a well known fact that almost all commodities vary in quality; that is, there are "seconds." It is, therefore, inevitable that some purchaser will receive subgrade articles, unless there is adequate inspection and test. To expect any other result is to disregard the lessons of experience. Granting reliability and good intentions of the vendor, errors occasionally are made in manufacturing and in delivery. The use of a specification without check provides no assurance that commodities of the specified grade will be furnished. Adequate specifications show that the purchaser knows what material he

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wants and adequate inspection and test insures that the specified grade of article will be furnished.

One of the most difficult problems of purchasing without specifications in the Government service, as well as in the commercial world, is the evaluation of quality and price among bidders, for a given article. This situation is cleared by the use of proper and adequate specifications. Purchasing by bids based upon well-formulated specifications really sets an upper and lower limit to the range of this evaluation. The article that is too good is eliminated in the price comparison of bids; the article that is too poor in quality is eliminated by the minimum quality set by the specification.

The economic utility of a commodity, or its utilization value for a particular purpose, obviously is dependent upon its kind or type and the use for which it is intended. The real *cost* of an article is the *price* of that article divided by the *service* it will render. It is the business of the buyer or user to determine, if possible, the cost as well as the price of an article. This usually involves both economic and technical knowledge.

The Government as a large buyer is particularly interested in the performance or utility of an article in service, and emphasis is therefore placed on specifying performance, where that method is possible, rather than physical properties, chemical composition, or method of manufacture, which frequently are related but indirectly to service requirements.

Purchase on a work-factor or utility basis insures a minimum cost per unit of service, whether it be miles for an automobile tire, weight of metal removed per minute for a tool steel, or the life of an incandescent electric lamp. Utility is the criterion by which materials or equipment should be judged as to their value, and utility is measured by the strict economic test of how much satisfactory service is received from it per dollar expended.

At the present time, several Federal Specifications are formulated on this basis. For example, incandescent electric lamps and dry cells. Lubricating oils are now being procured by most of the departments on a similar basis, under the Navy contracts. It is believed that the utility basis of specifications is the ideal to be striven for, and as many of the Federal Specifications as possible are so formulated.

In general, the specification writer should, as far as possible, either specify results desired and leave methods of production and properties to the manufacturer, or he should specify methods of production and properties desired, and assume the responsibility for results in service.

ESTABLISHMENT OF THE FEDERAL SPECIFICATIONS EXECUTIVE COMMITTEE

With the installation of the Bureau of the Budget in 1921, it was considered to be desirable to prepare standardized purchase specifications for many of the commonly used articles purchased by the Federal Government, and the Federal Specifications Board was established for that purpose by Circular No. 42 of the Bureau of the Budget, dated October 10, 1921, which was issued by the Director of the Bureau of the Budget, by authority of the President.

Each department and establishment purchasing materials and supplies in accordance with specifications, designated a representative to serve as a member of the Board. The Chairman *ex-officio* was the Director of the National Bureau of Standards.

Technical committees were formed, composed of qualified representatives from the various branches of the Government, to formulate the specifications. These specifications, after consultation with the interested industries, were submitted to the departments for comment and criticism, and after consideration of these comments the specifications were promulgated by the Federal Specifications Board.

The Federal Specifications Board, along with several other activities of the Government, was abolished by the Order of the Executive Director of the National Emergency Council, dated January 24, 1935, and in lieu thereof there was established a Federal Specifications Executive Committee by Circular Letter No. 106, dated July 16, 1935, issued by the Director of Procurement of the Treasury Department. The Federal Specifications Executive Committee functions under the jurisdiction of the Director of Procurement of the Treasury Department.

The membership of the Federal Specifications Executive Committee is composed of Dr. L. J. Briggs, Director of the National Bureau of Standards, Chairman; Mr. N. F. Harriman, Technical Assistant to the Assistant Director, Branch of Supply, Vice-Chairman and Technical Secretary; together with the following technical liaison representatives who have been officially designated by the heads of the respective departments, to collaborate with the Procurement Division:

Capt. Albert Norris, Navy Department
Lt.-Col. John Mather, War Department
Mr. Alex. McC. Ashley, Department of Agriculture
Mr. C. S. Beard, Post Office Department
Mr. A. J. Harrison, Veterans Administration

THE PREPARATION OF FEDERAL SPECIFICATIONS

The duties of the Federal Specifications Executive Committee in preparing Federal Specifications are the same as formerly obtained with the Federal Specifications Board. In lieu of the members of the Federal Specifications Board, technical liaison representatives have been designated from all of the interested departments and establishments which purchase materials according to specifications.

Specifications prepared by the various technical committees are submitted by the Chairman of the Federal Specifications Executive Committee to the Director of Procurement for approval, after which they are printed as Section IV of the Federal Standard Stock Catalog, and officially promulgated for use by the various activities of the Government by the Director of Procurement.

There are now seventy-seven technical committees, covering the following groups of materials listed in the accompanying table.

New specifications or revisions of existing specifications are considered by the appropriate technical committee and recommendations are made to the Executive Committee for consideration and submittal to the Director of Procurement for approval.

USE OF FEDERAL SPECIFICATIONS

The United States Government probably buys a larger proportion of its material, supplies, and equipment to specifications than any other organization in the world. The various departments and establishments have about 11,000 specifications, the Navy and War Departments alone have about 5500.

Technical Committees of Federal Specifications, Executive Committee

Appliances
Acoustical Correction Materials
Abrasives and Polishing Materials
Ball and Roller Bearings
Beds and Bunks
Brake Linings
Brick and Building Tile
Brushes and Brooms
Builders' and Miscellaneous Hardware
Cement, Lime and Plaster
Chemical Products
Color
Cordage
Detergents
Disinfectants
Drafting Equipment and Supplies
Electrical Supplies
Feeds and Forage
Fire Alarm Systems
Hand Fire Extinguishers
Fire Extinguishing Liquid
Floor Coverings (non-textile)
Foundry Apparatus
Furniture
Pressure and Vacuum Gages
Dimensional Gages
Gauze and Bandages
Glassware, Chinaware, Stoneware, etc.
Glue
Hair for Mattresses
Hand Tools
Heat Insulating Materials
Inks, Typewriter Ribbons, and Carbon Paper
Insecticides
Laundry Equipment
Leather Products
Life Preservers
Lubricants and Liquid Fuels
Lumber
Machine Screws, Bolts, and Nuts
Medical and Surgical Instruments
Metals
Motor Vehicles
Office Supplies
Packing and Gasket Materials
Paints and Oils
Paper
Photographic Supplies
Pipe and Pipe Fittings
Plumbing Fixtures
Provisions
Radio Apparatus
Refractory Materials
Refrigerators
Road and Paving Materials
Bituminous Roofing
Rubber Products
Burglar Resisting Safes
Fire and Petty Larceny Safes
Safety Goggles
Helmets, etc.
Safety Walkways
Screens and Screen Cloth
Shipping Containers
Sterilizing Equipment
Stitches, Seams, and Stitching
Storage Batteries and Dry Cells
Surveying Instruments
Tableware and Kitchen Utensils
Tackle Blocks
Telephones
Tents and Tent Appliances
Textiles
Thermometers
Wearing Apparel
Weighing and Measuring Devices
Wire Rope
Wood Preservation

Of course, many of these specifications may never be considered by the Federal Specifications Executive Committee, as they are used by one department alone, or they cover highly specialized or military articles. Up to the present time, April 15, 1937, 1118 Federal Specifications have been promulgated, covering the more important commodities.

In the preparation of Federal Specifications for material, supplies, and equipment, an effort is made to bring the specifications into harmony with commercial practice wherever conditions permit, to establish uniform nomenclature, to standardize dimensions which will insure ready interchangeability of supplies and inter-working parts made by different manufacturers, and to limit the number of types, grades, and sizes of articles purchased by the Government.

Federal Specifications are continually being revised to keep them abreast of the best current manufacturing practice, and the needs of the Government.

The use of specifications in purchasing eliminates the method of describing articles wanted, by citing the trade name or brand of some product, in the common phrase "so and so or equal." This practice is objectionable in that whenever an attempt is made to purchase an article other than that of the brand cited, the purchasing officer is immediately put on the defensive as to its being the "equal." Furthermore, since it probably requires chemical analysis or physical tests to be made on samples before award is made, as well as on deliveries, if the Government's interests are to be protected, the expense for testing is doubled.

The use of standardized Federal Specifications is also reducing to a minimum the practice of buying as "standard sample." Such a practice probably limits competition and at best the comparison of the standard sample with goods delivered frequently is inconvenient, as standard samples are more or less inaccessible not only to the trade, but also to the user, and there is the possibility that they will deteriorate or change in some of their characteristics. However, there are cases where it is admittedly necessary to have standard samples, for example, with color, finish, texture, or some characteristic that is difficult to describe in words.

The specifications promulgated by the Director of Procurement are used in connection with what is probably the largest purchasing program in the United States, and one of the largest in the world, and the variety of articles includes almost everything from hardware to hosiery, and from pig iron to provisions. About 125,000 different items are purchased and used by the various branches of the Government service.

In the preparation of Federal Specifications for Government use, the needs of the Government and the commercial products available are coordinated in a manner which is fair to and understood by both producer and the Government, and the use of these specifications has greatly simplified purchasing by the various agencies of the Federal Government.

The Federal Specifications prepared by the Federal Specifications Executive Committee and approved and promulgated by the Director of Procurement, are recognized as being a distinct accomplishment in standardization, not only in connection with Federal purchasing, but also in connection with non-Governmental activities, where they are being adopted more and more.

An Index of the various Federal Specifications now available may be obtained by purchase from the Superintendent of Documents, Government Printing Office, Washington, D. C.

New Members of Joint Research Committee

THE March BULLETIN included an announcement of the reorganization of the Joint A.S.M.E.-A.S.T.M. Research Committee on Effect of Temperature on the Properties of Metals and indicated that several new members had been appointed to the committee. The following seven new members have been officially appointed to the committee by joint action of the two sponsor societies:

W. H. Armacost, Combustion Engineering Co.
A. B. Bagsar, Sun Oil Co.
J. W. Bolton, The Lunkenheimer Co.
J. R. Freeman, Jr., The American Brass Co.
A. J. Herzig, Climax Molybdenum Co.
G. F. Jenks, Ordnance Dept., U. S. Army.
The Director, Naval Engineering Experiment Station, Annapolis, Md.

Symposium on Wear of Metals

Six Papers at Philadelphia Meeting

At a meeting at the Engineers' Club in Philadelphia on Monday, April 5, sponsored by the Philadelphia District Committee, there was held a most interesting Symposium on Wear of Metals.

There was an excellent attendance at both the afternoon and evening sessions at which the six papers comprising the symposium were presented. Dr. G. H. Clamer presided at the afternoon session and President A. C. Fieldner acted as chairman of the evening session. The six papers were as follows:

AFTERNOON SESSION

GENERAL DISCUSSION AND CONSIDERATIONS INVOLVED IN WEAR TESTING, INCLUDING THE CLASSIFICATION OF THE VARIOUS TYPES OF WEAR—H. W. Gillett, Metallurgist, Battelle Memorial Institute, Columbus, O.

SOME IMPORTANT VARIABLES ENCOUNTERED IN WEAR TESTS ON CAST IRON—D. E. Ackerman, Metallurgist, Research Laboratory, The International Nickel Co., Inc., Bayonne, N. J.

WEAR FROM THE TEXTILE INDUSTRY VIEWPOINT—Albert Palmer, Crompton & Knowles Loom Works, Worcester, Mass.

EVENING SESSION

WEAR OF METALS FROM THE RAILROAD VIEWPOINT—L. W. Wallace, Director, Equipment Research Division, Association of American Railroads, Chicago, Ill.

WEAR FROM THE AUTOMOTIVE VIEWPOINT—W. E. Jominy, Metallurgical Dept., Research Laboratories Section, General Motors Corp., Detroit, Mich.

WEAR FROM THE POWER EQUIPMENT VIEWPOINT—N. L. Mochel, Metallurgical Engineer, Westinghouse Electric and Manufacturing Co., Philadelphia, Pa.

Each of the contributions was extremely interesting and the symposium papers with the discussion are to be published in a special volume. Further details concerning this will be announced.

In his paper on considerations involved in wear testing Doctor Gillett pointed out that some of the important published studies began back in 1864. (An extensive bibliography is included in the complete paper.) He said "Despite all the thought and work on the subject and all the published articles, we are, broadly speaking, still a long way from being able to predict ahead of time, with the assurance required for reasonable engineering precision, what the relative lives of two competing metals will be in service and we especially lack the ability to put a new alloy, on which service experience is lacking, into its correct position in a list of wear-resistant alloys on the basis of some laboratory test. In the evaluation of corrosion resistance, it is beginning to be realized that there is no such thing as corrosion resistance inherent to a metal, apart from the particular corroding medium which is to meet the metal in service. To build an alloy to resist corrosion one must first understand the mechanism of corrosion in the particular service for which it is intended. In any such statement one may replace the word 'corrosion' by the word 'wear'."

He discussed some of the definitions of wear which had been evolved and gave the following as his conception of an adequate definition:—"Wear of a metal part is its undesired gradual change in dimensions in service under frictional pressure."

His paper included a detailed review of a large number of types of wear tests and machines which had been developed.

In summing up the situation Doctor Gillett quoted from a 1928 editorial in the journal *Engineering* as follows:

"There appears nevertheless to be a certain limited sphere of usefulness of accelerated wear tests of the laboratory type. The extent to which wear proceeds cannot be expressed in terms of one value alone, neither, therefore, does it seem probable that one single appliance will yield reliable results if used for the determination of several types of wear. If, however, the apparatus or method be restricted to the elucidation of one aspect of the question and that concentrated upon, the results obtained will no doubt be of service. This course, we are afraid, leads to the carrying out of necessarily somewhat lengthy tests, using various appliances in order to establish the wear resisting characteristics of a material with anything approaching finality; consequently some engineers may persist in the opinion that after all, long-time tests *in situ* are the most generally satisfactory.

Doctor Gillett "agrees in general, though he is very doubtful of the reliability and accuracy of the reports of 'tests *in situ*,' as those reports are usually obtained, and would ordinarily prefer simulated service tests in the laboratory, under laboratory control and operation."

He concluded as follows: "Wear resistance is not an inherent property. It cannot be determined or even discussed apart from the specific conditions of use, any more than can machinability or corrosion resistance. . . . So let's stop bewailing the lack of a 'standard' wear test. There isn't any such animal, and there ought not to be. Instead let's each build wear test outfits as we need them, intelligently designed to simulate the particular service we want to improve. Our aim must be, in the classic words of Gilbert & Sullivan, 'to make the punishment fit the crime'."

General arrangements for the meeting and informal dinner were made by H. M. Hancock, chairman of the Philadelphia District Committee. Doctor Clamer developed the Symposium on Wear Testing, for the Committee.

Correction in Riehle Advertisement

On the inside front cover of the March A.S.T.M. BULLETIN, the Riehle Testing Machine Division of American Machine & Metals, Inc., featured as an advertisement, a "Giant Riehle Fatigue Tester". This new machine, which was indicated as being "one hundred times larger than the largest machine of its kind . . . capable of testing two railroad car axles up to 14" in diameter to destruction at the same time"—rotates at a speed of *1100 rpm.* Unfortunately, in the advertisement as printed, the speed was indicated as 11 rpm. The high speed is, of course, one of the features of the machine.

Specifications for Gasoline Issued

ON THE recommendation of Committee D-2 on Petroleum Products and Lubricants, New Specifications for Gasoline (D 430-37 T), were approved for publication as tentative on March 30, by Committee E-10 on Standards. The specification requirements have been under development in Committee D-2 for some time.

The scope of the specifications states that they are for the use of purchasing agencies in formulating specifications for purchases of gasoline under contract and that they are not a definition of gasoline. They do not include all types of gasoline or motor fuel satisfactory for motor vehicles since certain equipment or conditions of use may require fuels having special characteristics.

The specifications provide three types of gasoline, as follows: Type A, for use under normal conditions; Type B, for use where a gasoline of greater over-all volatility than Type A is desired; and Type C, for use where a relatively non-volatile fuel is desired.

The specifications state the required properties of gasoline at the time and place of delivery in bulk. They provide for an automatic variation by the seller to meet the requirements of seasonal changes in temperature depending upon the season and the locality in which the product is to be used. This is done by providing three vapor pressures and 10 per cent distillation points for each type specified and by differentiating the use of these variations according to the months of the year and the geographical location by states.

It is indicated in the requirements that the purchasing agency shall state the minimum octane number as agreed upon with the seller; specify the volatility Type A, B, or C, desired; and indicate the season and locality in which the fuel is to be used. The various requirements given in the new tentative standard which are to be determined in accordance with test methods issued by the Society involve distillation, vapor pressure, octane number, corrosion, and gum.

Each member may obtain a copy of this new tentative standard without charge by writing A.S.T.M. Headquarters. Copies can be purchased at 25 cents each; 10 to 24 copies, 20 cents each; 25 to 99, 17½ cents; quotations on larger quantities.

Progress in Work on Soaps and Detergents

AT A well-attended all-day meeting of A.S.T.M. Committee D-12 on Soaps and Detergents held at the Hotel New Yorker on March 30, important progress was made in various activities being carried on by this committee. Certain subcommittees met on the previous day in order to develop recommendations for reference to Committee D-12.

Several new specifications which have been under consideration in subcommittees were reported favorably and by action of the meeting are to be submitted to the committee for letter ballot. These will provide standardized requirements for milled toilet soap, soda ash, sesquicarbonate and caustic soda and in addition a number of definitions covering soap and certain types of soaps were approved and will be balloted upon. Among the definitions which will be submitted for approval are the following:

1. SOAP is the product formed by the saponification of fats, oils, rosin or their acids with organic or inorganic bases.
2. COMMERCIAL SOAP is soap with or without builders.
3. ANHYDROUS REAL SOAP is the product of the combination of fatty acid anhydrides and the equivalent amount of organic or inorganic base.
4. POWDERED SOAP is commercial soap which has been reduced to small particle size.
5. BUILT SOAP is soap containing one or more builders.
6. SOAP CONTENT is the quantity of Anhydrous Real Soap present.
7. SOAP POWDER is a water soluble powdered product, consisting of soap and one or more builders, in which the soap is a minor constituent.
8. An ALKALI CLEANER is a water soluble product having detergent qualities but containing no soap.

The committee is giving consideration to proposed specifications for trisodium phosphate and methods of analyses for sulfonated oil. It is indicated that these two items will be published in the 1937 Report of Committee D-12 for information and in order to solicit comments. A specification for built soap was discussed and is being given further consideration.

The meeting was in charge of H. P. Trevithick, Chief Chemist, Bureau of Chemistry of the New York Produce Exchange, chairman of the committee, and the secretary, B. S. Van Zile, Chemist, Colgate-Palmolive-Peet Co.

District Meeting in Detroit

AN interesting and successful meeting was sponsored by the Detroit District Committee at the Fort Shelby Hotel, Detroit, on Wednesday, April 7. Many of the A.S.T.M. members and associates in the Detroit area attended the meeting and a number of guests were present from Akron, Ohio, to hear the paper on "Recent Progress in Rubber Technology" presented by Dr. W. A. Gibbons of United States Rubber Products, Inc.

W. H. Graves, chairman of the Detroit District Committee, presided and H. J. Campbell, Secretary of the Detroit Board of Commerce, was the toastmaster. Included in those at the speakers' table were Dr. F. O. Clements, Technical Director, Research Laboratories, General Motors Corp.; G. T. Christopher, Vice-President of Manufacturing, Packard Motor Car Co.; A. E. White, Vice-President of A.S.T.M., and Director of Department of Engineering Research, University of Mich.; and C. F. Hirshfeld, Chief of Research Dept., The Detroit Edison Co.

President A. C. Fieldner gave an interesting talk on A.S.T.M. activities covering new committees that have recently been formed. He also discussed increased membership and commented on the relation between the work of the Society of Automotive Engineers and the A.S.T.M. He outlined some interesting experiences which have occurred at the U. S. Bureau of Mines, touching on the recent school explosion in Texas and what is being done toward the prevention of a repetition of this disaster.

H. T. Woolson, Chrysler Corp., and President of the Society of Automotive Engineers, next introduced, gave a very interesting talk on the relation of A.S.T.M. to the engineering profession.

The main feature of the evening was the paper by Doctor Gibbons—see following pages. Covering important recent developments in the rubber field, it will be of interest to a large number of Society members.

Recent Progress in Rubber Technology[1]

by W. A. Gibbons[2]

TESTING methods are indispensable to sound technical progress. While the technical success of modern manufacturing methods has been explained in various ways, I prefer to regard this success as the resultant of two forces. One of these is the creative imagination of the inventor. The other is the perception of the scientist and engineer in establishing quantitative methods for observing and studying fundamental properties. Valid test methods are the milestones on the road of progress from the arts and handicrafts to industrial science. The development of the modern motor car is a monument to the inventor, and to his associate, the testing engineer, whose combination of analytical reasoning, skill, and no small amount of mental self-discipline have converted a luxury into an everyday necessity. This meeting is in itself evidence of the importance of testing in our basic industries.

Although the rubber industry is one of the older industries, several generations intervened between the discovery of vulcanization and further major technical developments. A great deal was done on *applications* of rubber, but there were few additions to our fundamental knowledge of the variables which affect the processes of the industry—how these could be measured and controlled. Considerable progress has been made, however, since the war and today rubber technologists are aware, as never before, of the importance of this field of study.

Rubber possesses remarkable and unique physical properties, which are made use of in its practical applications and therefore should be accurately controlled. These properties such as high stretch, great strength and resistance to wear, and the ability to store up and return large quantities of mechanical energy are extremely sensitive to slight changes in composition and processing conditions. These facts account both for the present activity in the quantitative study of rubber, and also for the time required to secure results.

Among the fundamental processes used in manufacturing rubber goods are calendering and vulcanization, the latter being common to practically all rubber manufacture. We have to rely greatly on the accuracy of the calendering or the tubing operation to give us the desired degree of dimensional precision in the finished product, and such precision is highly important both from the standpoint of quality and cost. The most important variable in these operations is the plasticity of the batch.

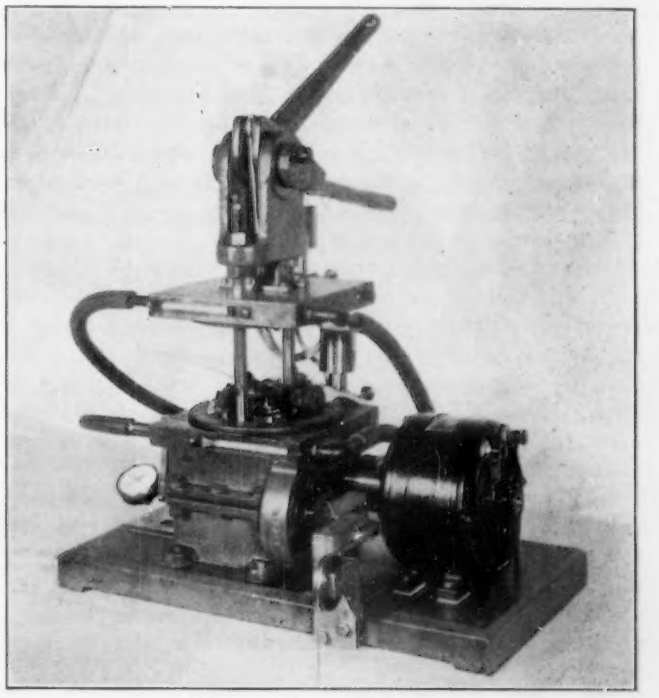
The vulcanization procedure is fundamentally one of subjecting the batch under the proper conditions to heat for a definite length of time. While the nature of the process is not fully understood it undoubtedly involves a chemical reaction in which sulfur plays a major part. Vulcanization produces an enormous change in the properties of rubber and to obtain high and uniform quality the vulcanization process must be controlled. Methods have been developed for controlling these two important variables—plasticity and degree of vulcanization.

TESTING PLASTICITY

Until 1923 the breaking down and mixing of rubber compounds was done largely by rule of thumb methods, but in that year the first practical instrument for testing the plasticity of rubber was introduced. It was described in a paper by Ira Williams before the American Chemical Society.[3] Shortly there was general adoption of this simple type of instrument and since that time the measurement of plasticity in rubber factories has been common practice and has undoubtedly had an important influence on both the quality and cost of the product. Other forms of instruments for measuring the same property have been developed, to secure certain other advantages from the standpoint of ease of operation or to place greater emphasis on certain phases of the phenomena under study.

The procedure for the Williams' type is to take a sample of known dimensions which can be cut from a sheet of rubber, or molded, and measure the amount of deflection of this cylindrical specimen under known conditions of temperature and load.

In a later instrument—the Mooney Plastometer, developed by the U. S. Rubber Co.,[4]—a sample of rubber is cut and formed automatically to constant volume and held in an enclosed space around a disk-shaped propeller which rotates at constant speed. The rubber is kept at uniform tem-



Mooney Plastometer—open

[1] Presented at a meeting sponsored by the A.S.T.M. Detroit District Committee, Detroit, Mich., April 7, 1937.

[2] Director, Development Dept., U. S. Rubber Products, Inc., Passaic, N. J.

[3] *Industrial and Engineering Chemistry*, Vol. 16, pp. 362-364 (1924).

[4] *Industrial and Engineering Chemistry*, Analytical Edition, Vol. 6, pp. 147-151 (1934).

perature, usually 100 C. The force required to shear this rubber is determined at a uniform rate of speed.

The principle of this instrument is somewhat different from that of the Williams instrument. Viscosity is the force required to produce a uniform rate of shear, and the Mooney instrument aims to do this. With the Williams instrument the rate of shear varies continuously with the change in dimensions of the sample. A practical advantage of the Mooney instrument is that it is self-contained, that is, it provides its own means for cutting the sample and keeping it at constant temperature. On this account, and also because the test is rapid, the instrument is well adapted to use in factory mill rooms as well as in laboratories.

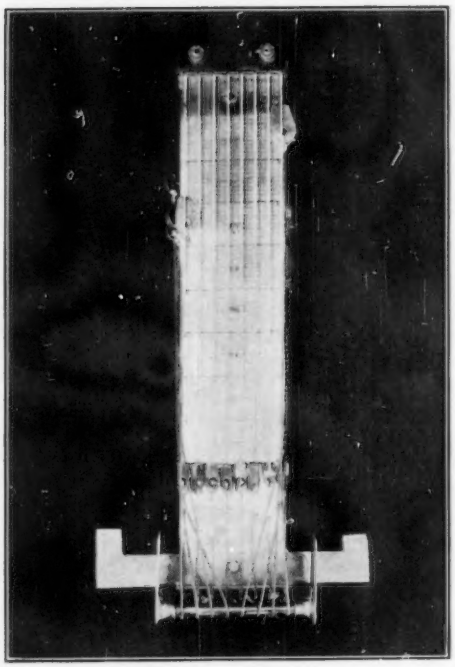
MEASURING VULCANIZATION

Several methods have been used for the measurement of the degree of vulcanization. The earliest quantitative test is probably the chemical method of extracting the sample with acetone and determining the amount of sulfur remaining in the rubber. This test requires several hours to accomplish and furthermore, in many cases, the results are not valid. Compounding materials and accelerators are frequently used which contain sulfur, and in many cases some of the sulfur added to the batch combines with some of the materials other than the rubber, but will, nevertheless, appear in the ordinary analysis as though combined with the rubber. On this account physical methods of determining the degree of vulcanization have been sought. This has a sound fundamental basis since, after all, the vulcanizing process, although chemical in nature, has for its object the modification of physical properties. One of the physical methods advocated has been the measurement of the stress-strain curve of the vulcanized sample and other tests which have been used include the determination of tensile strength for various durations of cure and the optimum resistance to deterioration or aging. All of these methods have certain objections, such as the time required to make the test, or the fact that variables other than degree of vulcanization will produce changes in the properties under observation.

One of the earliest tests for vulcanization, although not used in quantitative form until recently, was the degree of resistance of vulcanized rubber to temperature changes. In fact, one of the reasons for the study of methods of hardening or vulcanizing rubber was the fact that unvulcanized rubber would become hard and brittle at low temperatures, and soft and sticky at high temperatures. The improved resistance of vulcanized rubber to low temperature is, moreover, a property which depends almost entirely on the degree of vulcanization and is not greatly affected by other substances. A test was developed a few years ago at the General Laboratories of the U. S. Rubber Co. which is known as the "T-50 Test" and which is essentially a reduction to quantitative form of the observations of the earlier discoverers of vulcanization.[5]

In this test the vulcanized sample is stretched a known amount, usually to about six times its length, and is chilled to a low temperature (around —70 C.) while stretched. At this low temperature the sample practically freezes in the stretched condition and if released will show no tendency to retract. Rubber in this form is said to be racked.

[5] *Industrial and Engineering Chemistry*, Analytical Edition, Vol. 5, pp. 279-283 (1933).



T-50 Sample Rack Showing Several Samples Mounted for Test

The next step is to warm the bath and the sample gradually. As the temperature of the sample rises it will be noted that it gradually retracts. The temperature at which the sample has retracted half way toward its original length is observed. This temperature is called the "T-50 Temperature". The higher the degree of vulcanization the lower the T-50 temperature will be. The only readings which the operator makes are the length of the sample and the temperature at which the length has been reduced to one-half the original stretched length. A number of samples may be tested at one time and the apparatus is fairly inexpensive and simple to construct and operate.

This test, under proper conditions, correlates well with combined sulfur determinations. It is peculiarly useful in measuring the degree of vulcanization in samples which have been cured under different conditions of time or temperature or to measure the agreement between successive cures under supposedly identical conditions.

The rapidity of this test and its ability to check day-to-day results with the same compounding and curing conditions has made it suitable for use in factory control work both as a test for raw materials and also for finished batches. It is used in checking the production of tires, mechanical goods, footwear and sundries. It is particularly useful in measuring the vulcanization of products made from latex. The rubber derived directly from latex has not, of course, been softened by the mechanical milling processes and therefore tends in any case to give stiff, strong products which make it difficult to distinguish between degrees of vulcanization by merely feeling the sample or stretching it.

THE MANUFACTURE OF RUBBER GOODS DIRECT FROM LATEX

Some of the recent developments in the application of latex are of interest. Latex occurs naturally in the tree in the form of an aqueous dispersion of rubber. The latex is

obtained by cutting into the bark of the tree until the latex vessels are reached. These vessels are a system of fine connecting tubes in the living bark just outside the cambium layer. The latex oozes from these vessels, runs down the cut and drips into a container. Until a few years ago it was the practice to convert all of this latex into solid rubber and ship it in this form; however, large quantities of latex are now shipped in liquid form to Europe and America for the manufacture of various products by new methods. The properties of latex which make it interesting for rubber manufacture are: *1.* It permits the production of goods without going through the intermediate stages of coagulation, drying, breaking down, and calendering or tubing; *2.* In some cases better products can be produced than by older methods. In the development of these new manufacturing methods it has been essential to do a great deal of work in devising methods for testing and controlling both the process itself and the materials used in it.

One of the fundamental properties of the latex dispersion is that when treated with certain chemicals such as acids the rubber separates into a mass. This principle has been made use of in the production of rubber thread and similar products direct from latex. In the older methods the practice was to sheet the rubber on a calender, vulcanize the sheet and then cut it mechanically into fine strips or threads of square or rectangular cross-section. While this method is still used to a considerable extent, there has been developed a process in which the latex mixture flows through a nozzle into a bath, which coagulates it in the form of thread. The thread is dried, vulcanized, and the finished product spooled, the entire operation being continuous. In controlling this process we make use of the principles already described for checking the plasticity and the degree of vulcanization, although the tests are in somewhat different form.

Another application of latex is the manufacture of cushions, mattresses, etc. In these products the rubber is in the form of a latex rubber foam, as distinguished from sponge rubber. The structure of latex rubber foam, and the properties that it possesses, distinguish it from sponge rubber as we ordinarily understand that term. Sponge rubber is made by incorporating in a dry rubber compound gas-forming materials. When the mass is subjected to heat and certain temperatures are reached, gases are given off within the mass of the rubber. As these expand they form voids and stretch the rubber mass into sponge form. Sponge rubber made by this process usually has about one-third the density of the original rubber, and to get a lighter product requires rich compounds of high plasticity.

Latex rubber foam is made by beating a milk rubber latex with a foaming agent, then causing the mass to jell, and then by vulcanization solidify, to permanent size and form. By this method the cell structure can more or less be controlled to suit what is wanted and the density or the increase in volume can be controlled over a much wider range than by the other methods.

Another essential difference in the two types of material is that latex rubber foam is completely porous even to the skin itself whereas sponge rubber made by other processes is much less porous, and in some cases not porous at all.

The application of latex rubber foam up to the present time has been largely confined to places where softness with resiliency is desired, where lightness is a factor, and where vibration and shock are factors to be eliminated. Rapid strides have been made in the use of this material in replacing steel springs for seating of all kinds but more particularly in moving vehicles such as railroad trains, buses, trucks and automobiles. The material is also coming into use for mattresses, furniture, cushions, and pillows. Its use in vehicles has been largely due to the fact that because of its porosity air passes freely through it, removing the heat of the body of the person resting on it, and because of its ability to be soft enough to shape to the contours of

Cushion of Latex Rubber Foam—Showing Interior Construction

the body and yet firm enough to sustain the weight of the body and at the same time absorb vibrations to a very marked degree. When in use on a vehicle the movement caused by the sway of the car and the weight of the body results in a pumping action which forces air into and out of the cushion, even through the surface skin itself. This essential property makes it suitable for purposes where ordinary sponge rubber would not be at all suitable. Its uniform density causes it to conform easily to various contours, which evenly distributes weight throughout the entire bearing surface, which results in lower intensity of pressure and added comfort to the person resting on it.

Rubber itself can be compounded in such a way as to have a high hysteresis, or ability to absorb energy. In addition to this property of the material itself the cellular structure permits of compressibility without transmission through the mass as would occur in a more solid or dense structure, and because of these two properties this particular type of material absorbs shock and vibration to a very marked degree.

An application of latex which is being used to a considerable extent is in the production of insulated wire. In the ordinary process for insulation the rubber is run through a tuber and out through a die. The copper wire to be

insulated is passed out through the same die concurrently so that the finished product is a copper core surrounded by a more or less concentric sheath of rubber. The rubber is then vulcanized.

In the latex process a bare wire is passed through a bath of a suitable latex compound, up through a tower which dries the coating, then through a second bath followed by a second drying operation, and so on until a sheath of the desired thickness is built up. The latex used in this particular application must be purified to remove certain water soluble ingredients which occur in the natural dispersion and which if left in would injure the electrical properties of the insulation.

Wires made in this way from a satisfactorily pure latex show superior dielectric properties and have the added advantage of giving a more concentric sheath. The high degree of concentricity obtained by this latex method permits the use of a thinner wall to obtain the same insulating effect over a length of wire since the tolerances are reduced. This produces a lighter wire and a smaller wire for a given electrical property, making this type of wire highly desirable for many uses where the weight and size must be kept to a minimum.

THE USE OF RAYON IN TIRES

Tire engineers have welcomed the development of a synthetic material for use as the strain resisting members in pneumatic tires. They realize that with increasing bus and truck operating speeds and the development of super-highways, they will some day be faced with conditions more severe than can be taken care of by the best quality cotton cord available. The modern pneumatic truck tire has, to date, kept pace with automotive developments and will probably be adequate for a long time for a large percentage of consumer requirements. The more forward looking tire manufacturers, however, have been working for some time on the development of a substitute for cotton cord.

Pneumatic heavy service tires have certain requirements in carcass strength. These requirements have been met with the use of the best possible cotton making the strongest possible cord. As carrying capacities and cross-sections of tires increase, carcass strength requirements likewise increase. It is the practice of the industry to meet these requirements with an increasing number of plies. There is a limit, however, to changes in this direction. As carcass thicknesses are increased, the heat generated through deformation of the tire in service also increases; likewise compression and extension strains on the internal structure are materially increased.

With the best engineering practice known, it was being realized more and more that eventually stronger materials and materials having greater fatigue resistant capacities would have to be developed if tire engineering were to keep itself abreast of automotive engineering and the development of super-highways. Several years ago, chemists brought forth their first attempt to develop a rayon yarn for use in tires, and like most developments of this kind, early attempts were not successful. Today, however, sufficient progress has been made to warrant the use of a cord made from rayon as a substitute for the cotton cords universally used. At its present stage of development, rayon yarn being used for tire cord is from 50 to 100 per cent stronger than the common commercial variety of rayon. This strength is obtained without sacrifice of the very necessary flexibility required in tire cord.

In comparing the relative merits of cotton and rayon cord, it is necessary to consider the fact that the moisture-strength relationships of the two materials are entirely different. A cord made of cotton becomes materially weaker as it loses its moisture, while a cord made of rayon becomes materially stronger. It is necessary also to give consideration to a difference in their density. A rayon cord is somewhat more dense than a cotton cord. In the development of rayon tires, advantage has been taken of these relatively favorable characteristics.

The use of rayon cord presented a rather difficult problem from the standpoint of obtaining adequate adhesion between its surface and the rubber insulating materials of the carcass. The difficulties have very definitely been overcome and the present tires are entirely adequate in this respect. Modifications of latex adhesive solutions which have been in use for a considerable number of years form a base for the solutions now in use in rayon tires.

It should be realized that the development is still in the early stages and, while extremely successful tires have been developed, the ultimate possibilities in rayon have not yet been achieved. A super quality tire has been produced, but demonstration of its super quality can be made only under extremely severe service conditions.

The growth of this important development is dependent on several factors. At present, rayon tire cord of suitable quality is materially higher in cost than even the most expensive cotton cord. Experience only will answer the question as to what portion of the total heavy service tire usage will require its superior qualities. The trend toward superhighways, high-speed bus operations, and high-speed long distance freight haulage seems to indicate that eventually there will be an increasing demand.

The development of the rayon tire is a splendid illustration of cooperation of chemists and engineers in the improvement of an extremely important article of commerce which will assist the continued progress of the automotive industry.

Speeding Death

LET'S think less about saving seconds and more about saving lives.

The honest-to-goodness excuses for fast driving on crowded streets and highways are few and far between. Doctors on emergency errands of mercy, ambulances hurrying sick or injured persons to hospitals, firemen bent on saving life and property have a reason for speeding through traffic.

But there is no excuse for the average motorist to drive at excessive speed, imperiling his own and other persons' lives.

Resolve today to be a better driver and a safer driver. In that way you can help reduce traffic deaths.

John Jaster, Jr., Ohio Highway Director, in *The Highway Magazine*.

XIV. Long-Time Society Committee Members

Fourteenth in the Series of Notes on Long-Time Members

As a continuation of the series of articles in the A.S.T.M. Bulletin comprising notes on some of the outstanding activities of long-time members of the Society, particularly their service in Society work, there are presented below notes on three additional members. In general, the men whose sketches will appear in this series will have been affiliated with the Society for 25 years or more and will have taken active part in various phases of Society work for long periods. No definite sequence is being followed in these articles.

F. P. Veitch, Chief, Naval Stores Research Division, Bureau of Chemistry and Soils, U. S. Department of Agriculture, Washington, D. C., is a graduate of the old Maryland Agricultural College (now the University of Maryland) class of 1891. He received the M.S. degree in chemistry from George Washington University in 1897, and honorary D.Sc. from the Maryland State College of Agriculture (Maryland Agricultural College) in 1913. He has been in the United States Department of Agriculture since 1900 and from 1904 he has continuously engaged in and directed research work on paper, leather and leather-making materials, preservative treatment of fabrics, turpentine and rosin and on the industrial utilization of agricultural by-products.

F. P. Veitch Cloyd M. Chapman H. A. Gardner

Mr. Veitch has been a member of the Society since 1908 and his period of service on Commitee D-1 on Paint, Varnish, Lacquer and Related Products has been continuous since 1912. He has been chairman of Committee D-17 on Naval Stores since its formation in 1924, was a member of Committee E-6 on Papers and Publications, and has also served as a member of Committee C-7 on Lime.

He is a member of several Government technical committees, a fellow of the American Association for the Advancement of Science, member of the American Chemical Society, Association of Official Agricultural Chemists, American Leather Chemists' Association, International Society Leather Trades Chemists, and the Maryland Historical Society.

Cloyd M. Chapman, Consulting Engineer, New York City, prepared for Cornell University at Buchtel College in Akron. He took the mechanical engineering course at Cornell University, Class of '98, and interrupted his course to enter the Navy as Engineer Officer (Ensign) during the Spanish-American War. Later he entered the employ of Thomas A. Edison, serving as assistant in his laboratory at West Orange, and also in mining exploration and development in Canada, New Mexico and Australia.

In 1905 he entered the employ of Westinghouse, Church, Kerr & Co., as construction engineer, and later as engineer in charge and engineer of tests in charge of laboratory examination of materials of construction. He specialized in power plant and manufacturing plant design and construction, and in design of special machines.

Mr. Chapman has been affiliated with the Society since 1908. He has been a most active member serving on a large number of committees and taking part in other phases of important Society work. The committees on which he has had long periods of service include A-5 on Corrosion of Iron and Steel since 1914; D-1 on Paint, Varnish, Lacquer, and Related Products; C-7 on Lime; C-9 on Concrete and Concrete Aggregates (vice-chairman for several years; chairman, 1926 to 1932); C-1 on Cement, since 1916; D-15 on Thermometers and Laboratory Glassware and several others. He has been chairman of Committee E-8 on Nomenclature and Definitions since 1922 and is now chairman of Committee E-10 on Standards.

A member of the Executive Committee, 1926 to 1928, he was vice-president from 1930 to 1932 and served as president, 1932 to 1933.

Despite his intense activity in so many phases of A.S.T.M. work, he has also been active in the work of other organizations. He is a member of The American Society of Mechanical Engineers and represented the A.S.M.E. on the Council of the American Standards Association of which he was vice-president and director. He is a former director of the American Concrete Institute and a member of the Edison Pioneers.

Dr. H. A. Gardner was graduated from Pawtucket High School and studied at Brown University and the University of Pennsylvania. Lehigh University honored him with the degree of Doctor of Science. He is Director, Scientific Section, National Paint, Varnish and Lacquer Association, and is Director of the Institute of Paint and Varnish Research, Washington. Doctor Gardner is also a Lieutenant in the U. S. Naval Reserve Force.

He has been affiliated with the Society since 1908. An outstanding authority in the field of preservative coatings, he has taken an extremely active part in the work of A.S.T.M. Committee D-1 on Paint, Varnish, Lacquer, and Related Products. A member of the committee since 1908, he served for a number of years as vice-chairman and has headed the work of several important subcommittees. He was particularly active in the early tests on the Havre de Grace Bridge and the Atlantic City tests, serving as chairman of the subgroups in charge of various phases of these investigations.

Doctor Gardner has been a member of Committee D-17 on Naval Stores since 1925, and is the American representative on the International Standards Association, Committee 35 on Raw Materials used in the Manufacturing of Paints. He served on the Society's Executive Committee from 1932 to 1934.

He is a member of the Subcommittee on Protectives, National Advisory Committee for Aeronautics; American Chemical Society; British Oil and Colour Chemists' Assn.; and the German Chemical Society.

A. S. T. M. BULLETIN

Published Bi-Monthly by

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Number 86 — April 30, 1937

An Annual Meeting in New York

OCCASIONALLY we have been asked, "Why is the annual meeting being held in New York?" Now, that's a fair question and there are many good reasons with which we have answered it. Perhaps we might profitably use a few inches of space and a few minutes of time in discussing this angle of the approaching meeting.

New York is the technical and engineering center of the country. In the New York district of the Society, comprising roughly a circle of fifty miles radius, there are nearly 900 members or over one-fifth of our membership of 3975, the largest concentration in any one industrial center. The Society membership north of the Potomac River and east of Ohio is about 1850, and for another 1000 members New York is only a night's journey away—indeed, only a few hours if you care to fly. So much for convenience of location.

Then, people like to go to New York. The reasons for going are many and diverse, but the fact is they do go. Therefore, we confidently expect the best attended meeting in our history. Committee meetings, the technical sessions, personal contacts, every purpose for which the meetings are held, are enhanced by good attendance.

The opportunity for attracting potential new members to an annual meeting is unexcelled—there are more technically trained men to the square mile in New York than anywhere else in the world. And our New York Committee is sparing no pains to tell them about the A.S.T.M. meeting.

Then, there is the Exhibit! The first three Exhibits were held in the middle West; the East was due for the fourth. The combination of one of the best exhibit cities in the country and the improved business conditions has put this Fourth A.S.T.M. Exhibit "over the top" in a way that has exceeded our expectations, and additional space has had to be provided. Unquestionably our exhibitors like New York and they are going to show us some of the most interesting developments in testing equipment we have yet seen. You must not miss it!

There is much of interest to see and to do in New York, both for the men and the ladies. Our hosts, the New York Committee on Arrangements and the Ladies' Entertainment Committee, are providing a splendid entertainment program. We know more than one member who has been flatly told by his better half that he is going to the meeting *with her.* The ladies' entertainment program accompanying this BULLETIN speaks eloquently for itself.

Moreover, the Meeting and Program Committees have done their bit to make it possible for you to enjoy some of these entertainment features. They have so arranged the technical program as to avoid any formal Society meetings in the evening. Think of it! an A.S.T.M. meeting with no evening sessions! True, we can still feel the pistol that was held at our head by the New York Committee, but there it is and we're rather glad of it. It's a fine program, too. Isn't there a catch somewhere, you ask? Well, y-es; there will *have* to be some committee meetings in the evening, and a few Round Table Discussions; but then one shouldn't go out on Broadway every night!

But, asks our inquirer, why go to a city like New York in the summer? Now, we do recall some meetings where the temperature was a little high. But, hope springs eternal in the breasts of even the most cynical of us. Besides, much of the public space in The Waldorf-Astoria (that's where we are meeting, you know) is completely air-conditioned—lobbies, dining rooms, the rooms in which our sessions will be held; and exhibit and other space is efficiently air-cooled. No matter what the weather man does to us, we ought to be comfortable at our work. And incidentally, the Waldorf is a grand place to meet.

It has been just twenty-five years since the Society held an Annual Meeting in New York. We venture the prediction that the meeting this year will be so successful and so enjoyable that no one will want to wait another twenty-five years to hold another meeting "like that fine one we held in New York back in 1937."

J. B. Young Appointed to the Executive Committee

BECAUSE of a change in his position, F. M. Waring, former Engineer of Tests, Pennsylvania Railroad Co., has tendered his resignation from the A.S.T.M. Executive Committee to which he was elected in 1936 for a two-year term. This has been accepted with regret by the Executive Committee. J. B. Young, Engineer of Tests, Reading Co., Reading, Pa., has been appointed to fill the vacancy created by Mr. Waring's resignation.

Mr. Young received his technical education at the University of Pennsylvania, having been awarded the degree of B.S. in chemistry in 1897. For many years he has been affiliated with the Reading Co., first as Chief Chemist and, since 1918, Engineer of Tests. A member of the Society since 1907, he has been very active in various phases of Society work, serving as secretary of Committee A-2 on Wrought Iron from 1912 to 1924, is now chairman, and he was chairman of Committee A-1 on Steel, 1926 to 1932. He also has been active in the work of other Society committees, being one of the original members of Committee D-11 on Rubber Products. He is at present serving as a member of A.S.T.M. Committee E-10 on Standards.

International Testing Materials Congress

THE recent London Congress of the International Association for Testing Materials brings to mind the relationship of the A. S. T. M. to the I. A. T. M. Our Society originated as an American Branch of the old International Association in 1898. It soon developed that geographical distance and difference in objectives militated against satisfactory participation in policy and control of international activities. The American group early desired to formulate standard specifications for materials whereas the European members were interested primarily in the study of materials and methods of testing. Also, it was not feasible, on account of distance, to have sufficient representation present at the meetings of the controlling board of direction to have a satisfactory voice in the formation of governing policies of the Association. Consequently, our present independent Society was formed in 1902. Individual membership in the International Association was retained by many of the American members until the activities were suspended during the World War. The Association was formally dissolved in 1925.

A group of Swiss and Dutch engineers felt that the work of the old association should again be taken up and accordingly, in 1927, arranged for the holding of an International Congress in Amsterdam. The official delegates attending that congress decided that a new international association should be organized and as a result of this decision a constitution was drawn up, the object of the association being "to secure international cooperation, exchange of views, experience and knowledge in regard to all matters connected with the testing of materials." To further this object it was proposed to hold international congresses at intervals of not less than three nor more than five years. A second congress was held in Zurich in September of 1931, and the one held in London this year is the third.

A number of American members took out membership in the International Association and at present there are 163 of our members who hold such membership. The Society's headquarters collects the dues and forwards them to the international secretary, Dr. M. Ros, in Zurich, Switzerland. Past-President W. H. Fulweiler is a vice-president of the Association and a member of its Permanent Committee.

Unfortunately, the intensive growth of national self-sufficiency since the World War has worked against a full restoration of the former position held by the International Association. This together with the world-wide industrial depression was responsible for the fact that the first two congresses were not very successful financially although fairly good technical programs were provided. With this situation in mind the British group under the able leadership of Dr. H. J. Gough has given special thought to the organization of the recent congress in London and an exceptionally good program was arranged. Some twenty American papers were contributed.

It is hoped that this congress will initiate a new procedure for organizing these International Congresses on Testing Materials. No one will deny their great value in exchanging views and experiences on the properties of materials and in methods of testing. Technical progress is furthered and the personal contacts made at these meetings are of great help to workers in this field.

International specifications do not seem feasible for some time to come, but progress can be made toward a greater uniformity in methods of testing and a better knowledge of the good points of the other country's methods. It is not necessary, and probably not desirable to attempt any formal international standardization of testing methods. Promotion of knowledge of the properties of materials and of methods of testing should be the purpose of these International Congresses. That this can be done has been demonstrated by the two hundred papers presented at the recent London Congress.

We extend our hearty congratulations to our British colleagues.

A. C. Fieldner

President.

F. O. Clements Makes Substantial Gift To A.S.T.M. Research Fund

DR. FRANK O. CLEMENTS, Technical Director, Research Laboratories, General Motors Corporation, and Past-President of the Society, has recently given to the Society approximately $7000 to be added to the principal of the A.S.T.M. Research Fund, in the form of shares of common stock of the General Motors Corporation. Under the terms of the deed of gift the income from this sum will be paid to an annuitant during her lifetime, after which the income reverts without restriction to the Research Fund. This very substantial gift brings the principal of the Fund up to $20,000. In accepting the gift, the Executive Committee has expressed to Doctor Clements its sincere appreciation.

Doctor Clements has long been interested in promoting the research activities of the Society. Many of us will recall the thoughtful analysis of this whole question that he made in his Presidential Address in 1932. He then held before us an inspiring objective—*a continual search for new knowledge.* He showed how our standardization activities themselves have brought us to the realization that this search is increasingly necessary; how "the new developments of today become the standards of tomorrow"; and he urged that "we must be active in gathering and disseminating new knowledge, lest we stand still." Referring to the A.S.T.M. Research Fund, which was then slightly over $8,000, he said: "The income from this fund is the only money of the Society that is directly available for support of our research effort; it must be, and fortunately it is, supplemented by funds and services contributed by industry for specific projects. But, how pitifully small is this income and how stupendous is the task! The time to endow research is when we have plenty of money. So let me suggest, when conditions rectify, that we greatly augment the principal of this account. An active research fund insures our future. Put it in your will; no money can be invested more usefully; it will work long and effectively after our day is done."

Since 1934 Doctor Clements has headed a small committee, comprising, besides himself, Past-Presidents H. F. Moore and K. G. Mackenzie, devoted to building up the Research Fund. Through their efforts several gifts have been received and a number of members have made bequests to the Fund in their wills. The generous gift that Doctor Clements has just made is in keeping with the spirit of his committee's efforts. We are sure it will inspire others to help augment the Research Fund as their interest in the Society may dictate and their means will permit.

Nominations for Officers

THE Nominating Committee to select nominees for Society officers met in Chicago during Committee Week. The personnel of this group was listed in the January BULLETIN. In accordance with the provisions of the By-laws of the Society, the following nominations for officers are announced:

For President:

A. E. WHITE, Professor of Metallurgical Engineering and Director of Department of Engineering Research, University of Michigan, Ann Arbor, Mich.

For Vice-President:

H. H. MORGAN, Manager, Rail and Fastenings Dept., Robert W. Hunt Co., Chicago, Ill.

For Members of Executive Committee:

P. H. BATES, Chief, Clay and Silicate Products Division, National Bureau of Standards, Washington, D. C.

H. F. CLEMMER, Engineer of Materials, District of Columbia, Washington, D. C.

G. E. F. LUNDELL, Assistant Chief, Chemistry Division, National Bureau of Standards, Washington, D. C.

H. C. MOUGEY, Assistant Technical Director and Chief Chemist, Research Laboratories, General Motors Corp., Detroit, Mich.

R. L. TEMPLIN, Chief Engineer of Tests, Aluminum Co. of America, New Kensington, Pa.

Each of the above nominees has indicated in writing his acceptance of his nomination. The By-laws provide that "further nominations, signed by at least 25 members may be submitted to the Secretary-Treasurer in writing by May 20, and a nomination so made, if accepted by the member nominated shall be placed on the official ballot" which "shall be issued to the members between May 20 and June 1."

UNIQUE INTEREST COLUMN

Editor's Note.—From time to time, our attention has been directed to unusual and very interesting items, special photographs, unique stories, old-time specifications, etc., and at the suggestion of certain members it has been decided to institute a "unique interest column" in the BULLETIN. Because of the unusualness of the items, it is believed they will be of wide general interest, even though they may refer to a specific field. Material for this column will be welcome from any of the members and those who may have information in their files or know of sources where appropriate items can be obtained are urged to send them to Society Headquarters. It is planned that the items used will relate to the materials field, but they may not necessarily refer specifically to standardization or testing. The column will be essentially a members' column and the names of members submitting items will of course be given.

Vitruvius (Famed Roman Architect) on Sands for Mortars—(About 25 B.C.)

In walls of masonry the first question must be with regard to the sand in order that it may be fit to mix into mortar and have no dirt in it. The kinds of pit sand are these: black, gray, red, and carbuncular. Of these the best will be found to be that which crackles when rubbed in the hand, while that which has much dirt in it will not be sharp enough. Again, throw some sand upon a white garment and then shake it out; if the garment is not soiled and no dirt adheres to it, the sand is suitable.

But if there are no sand pits from which it can be dug, then we must sift it out from river beds or from gravel or even from the sea beach.

After slaking it mix your mortar, if using pit sand, in the proportions of three parts of sand to one of lime; if using river or sea sand, mix two parts of sand with one of lime. These will be the right proportions for the composition of the mixture. Further, in using river or sea sand, the addition of a third part composed of burnt brick, pounded up and sifted, will make your mortar of a better composition to use. (Submitted by H. F. Gonnerman)

Proposed Changes in By-laws

SEVERAL proposed changes in the Society By-laws are to be submitted to the membership for approval at the annual meeting. The various reasons for recommending the changes will be given in the annual report of the Executive Committee which will be preprinted. The proposed modifications appear below.

Article I, Section 3.—Change the second paragraph to read as follows by the omission of the words in brackets:

A Junior Member shall have the same rights and privileges as a Member, except that he shall not be eligible for office, and his status shall be changed from that of Junior Member to Member at the beginning of the fiscal year next succeeding the date on which he attains the age of twenty-seven years. [Provided that a Junior Member holding membership at the date of adoption of this Section[1] shall be continued under that status until the beginning of the fiscal year next succeeding the date on which he attains the age of thirty years.]

[1 This Section was adopted on September 1, 1919.]

Article III, Section 4.—Change the last sentence to read as follows by the addition of the italicized words and the omission of those in brackets:

The nominations shall be announced to the members through a notice issued *on or before May 5* [during the last week in April].

Article III, Section 5.—Change to read as follows by the addition of the italicized figures and the omission of those in brackets:

Further nominations, signed by at least 25 members, may be submitted to the Secretary-Treasurer in writing by May *25* [20], and a nomination so made, if accepted by the member nominated, shall be placed on the official ballot.

Article III, Section 6.—Change the first sentence to read as follows by the addition of the italicized figures and the omission of those in brackets:

An official ballot shall be issued to the members between May *25* [20] and June 1, which ballot shall contain names of nominees made according to the provisions of this Article.

Article VI, Section 1.—Change the third sentence of paragraph (c) to read as follows by the addition of the italicized words and the omission of those in brackets:

During consideration of and action upon the recommendations of a standing committee, *the standing committee may designate representatives to present the recommendations in person, but without right to vote* [two designated representatives of the standing committee shall serve as members of the Committee on Standards, with full privileges of discussion and vote].

This change involves a corresponding change in Section 15 (c) of the Regulations Governing Standing Committees.

Article VII, Section 2.—Change to read as follows by the omission of the words in brackets:

The entrance fees, payable on admission to the Society, shall be $10 for Sustaining Members and Members and $5 for Junior Members. The transfer fee, payable upon transfer from one grade of membership to another, shall be the difference between the corresponding entrance fees. [Provided that the payment of such transfer fee shall not be required of any Junior Member holding membership at the date of adoption of this section.[2]]

[2 This Section was adopted on September 1, 1926.]

Provisional Program

FORTIETH ANNUAL MEETING

of the

AMERICAN SOCIETY FOR TESTING MATERIALS

NEW YORK CITY **THE WALDORF-ASTORIA** **JUNE 28-JULY 2, 1937**

Summary

	Morning	Afternoon	Evening
Monday, June 28	Registration Committee Meetings	Exhibit opens—noon 1. 3:30 p.m. Formal Opening Session	Round Table Discussions Committee Meetings Exhibit Open
Tuesday, June 29	2. Symposium on Consistency 3. Coal and Coke	4. Coal and Coke 5. Paint and Related Products 6. Bituminous Materials	
Wednesday, June 30	7. Road Materials, Bituminous Materials 8. Masonry Materials, Refractories 9. Fatigue, Effect of Temperature	10. Steel, Wrought Iron 11. Petroleum Products, Electrical Insulating Materials, Rubber, Textiles, Soap 12. Marburg Lecture	Round Table Discussion Exhibit Open Committee Meetings
Thursday, July 1	13. Timber and Naval Stores 14. Cement and Concrete 15. Corrosion	16. Water 17. Methods of Testing Golf Tournament and Recreation	
Friday, July 2	18. Iron 19. Non-Ferrous Metals	No Sessions	

Monday, June 28 3:30 P.M. First Session

Formal Opening Session

President's Address; Award of Honorary Memberships

Formal Opening of the Fortieth Annual Meeting. President A. C. Fieldner.

Report of Committee E-9 on Research. P. H. Bates, Chairman.

Contains a brief summary of research activities and the work of the several research committees of the Society.

Report of Committee E-10 on Standards. Cloyd M. Chapman, Chairman.

Reports on specifications and methods of test submitted under the procedure for acceptance and publication of new and revised tentative standards and tentative revisions of existing standards in the interim between annual meetings of the Society. Reports on new standing committees being organized on paper and paper products, glass and plastics; also considerations being given to undertaking work on thermal insulating materials. Reviews standardization projects considered during the year.

Annual Report of the Executive Committee. C. L. Warwick, Secretary-Treasurer.

A general report of Society activities with particular reference to membership, publications, finances and administrative matters relating to committee activities and inter-society relations.

Annual Address by the President: "Fuels of Today and Tomorrow," A. C. Fieldner.

Award of Honorary Memberships.

Introduction of Newly Elected Officers.

The terms of the new officers, under the provision of the By-laws, begin at the close of the annual meeting.

Miscellaneous Business.

Monday, June 28 8 P.M.

Round Table Discussion on Precision and Accuracy

This informal round table meeting is to be held under the joint sponsorship of Technical Committee IX on Interpretation and Presentation of Data and Technical Committee XI on Designation and Interpretation of Numerical Requirements, of Committee E-1 on Methods of Testing. The terms "precision" and "accuracy" are frequently used in the standards and other publications of the Society. It would appear that these terms, as well as the related terms "sensitivity" and "reproducibility of results," have frequently been used incorrectly and there is a rather wide divergence of views with respect to their meanings.

The discussion on the several phases of the subject will be opened as follows:

Discussion Dealing with the Fundamental Aspects of the Subject—W. A. Shewhart, Bell Telephone Laboratories.

Discussion Relating to the Field of Mechanical Testing—H. F. Moore, University of Illinois.

Discussion Relating to the Field of Chemical Analysis—G. E. F. Lundell, National Bureau of Standards.

It is hoped that the meeting will help to clarify the understanding of engineers with respect to the significance and use of the terms "precision," "accuracy," "sensitivity" and "reproducibility of results," both qualitatively and quantitatively.

Monday, June 28 8 P.M.

Round-Table Discussion on the Physical Basis of Metal Properties

Sponsored by the American Institute of Physics in cooperation with the American Society for Metals, the American Institute of Mining and Metallurgical Engineers, and the A.S.T.M.

Tuesday, June 29 9:30 A.M. Second Session

Held Simultaneously with Third Session

Symposium on Consistency: Critical Discussion on Present-Day Practices in Consistency Measurement

The Technical Committee on Consistency, Plasticity and Related Properties, of the Society's Committee E-1 on Methods of Testing, has before it as a primary consideration the establishment of authoritative nomenclature and fundamental principles underlying the measurement of these properties of materials. It is proposed to consider in this symposium the advances made in consistency measurement, including a discussion of the theoretical background and the existing nomenclature. The symposium will comprise a series of individual contributions comprising critical considerations of consistency measurement as applied to different materials and discussing the possibilities of standardization and the use and advantages to be derived from the use of absolute units of measurement.

Introduction. W. H. Fulweiler, Chairman, Committee E-1 on Methods of Testing.

Progress in Consistency Measurement Since the 1923 Symposium, and Outlook. E. C. Bingham, Chairman, E-1 Technical Committee on Consistency, Plasticity, Etc.

Reviews progress in consistency measurement and points out realization of need for practical standard for measurement of viscosity. Discusses fundamental considerations in measurement of consistency in absolute units. Advocates use of two liquids for purpose of calibration and notes advantages of a third. Discusses importance of varying rate of shear in studying plastic substances. Purposes use of any type of viscosimeter, consistometer or plastometer, including short cut methods, provided they are properly calibrated to give within the range of their use precise values in absolute units.

Definition of Consistency and Theoretical Considerations. Melvin Mooney, U. S. Rubber Products, Inc.

Various rheological tests established by the Society for materials other than simple (Newtonian) liquids have been analyzed. Presents results in a table showing the rheological classification of the material tested, together with those features of the rheological diagram that are most important in determining the results in the particular test. Suggests that any test should either be thoroughly "practical," in that the testing arrangement should resemble as closely as possible some particular service condition; or should be thoroughly scientific, in that the testing arrangement be such that the data can be calculated as points on the rheological diagram.

Consistency Measurements in the Paint Industry. D. L. Gamble, The New Jersey Zinc Co.

Presents a résumé of the present status of consistency measurements in the paint industry. Discusses briefly the various types of consistency apparatus used in the paint industry, the limitations and advantages of the different types, and the present methods of expressing consistency. The significance of consistency measurements as made by present-day practices and some of the problems involved in paint consistency determinations are also briefly discussed.

Viscosity Measurement of Rosins and Resins. W. A. Kirklin, Hercules Powder Co.

Brief résumé of methods used for determining softening point and viscosity measurements on rosins and resins. Includes experimental results showing typical behavior of different types of testing instruments. Discusses advantages and limitations of the various types of test apparatus and emphasizes the need for the development and perfection of more suitable methods.

The Flow Properties of Asphalts Measured in Absolute Units. R. N. Traxler, The Barber Co., Inc.

Describes methods for measuring in absolute units low and high viscosities, and for evaluating the flow of non-viscous materials. The capillary tube, falling-coaxial cylinder, and rotating cylinder types of viscometer are recommended for various kinds and consistencies of asphalt. Properties of asphalts that have been recognized by the use of sensitive, absolute methods are enumerated.

The Desirability of Replacing Some of the Consistency Tests at Present Employed in the Tar Distilling Industry by Absolute Viscosity Measurements. E. O. Rhodes, E. W. Volkmann and C. T. Barker, Koppers Products Co.

When it comes to evaluating the change of viscosity with temperature, the customary viscosity tests are not satisfactory because it is difficult to correlate the results obtained from different empirical testing devices. The study of viscosity temperature relationships is facilitated by the use of absolute viscosity units. One absolute viscometer based on the principle of capillary rise has been found well suited for the testing of tar products having a viscosity range between 0.1 and 10^6 poises. By the use of this instrument tests were performed to study the viscosity-temperature relationships on a number of typical coal-tar products. The results of this work made it possible to check proposed formulas for the conversion of empirical test results into absolute units and to investigate a method for the use of the standard penetrometer as absolute viscometer.

Viscosity Measurement of Petroleum Products and Lubricants. J. C. Geniesse, Atlantic Refining Co.

The methods now used by the petroleum industry for the measurement of viscosity or consistency are briefly discussed and illustrated. The application and interpretation of the results together with their limitations show that there is a need for the development of methods which are more significant. The use of kinematic units of viscosity in place of the time of efflux for the Saybolt thermo, Furol and Universal viscosimeters will eliminate considerable confusion, thus making it possible to use one scale instead of three or more. The units are more significant since they are proportional to friction loss and heat developed. A new kinematic viscosity-temperature chart is also described.

Consistency Measurement of Rubber and Rubber Compounds. J. H. Dillon and L. V. Cooper, Firestone Tire and Rubber Co.

Presents a discussion of the nature of the rheological problem for rubber. The various instruments employed in testing the rheological properties of rubber are described and classified according to the requirements of an ideal testing instrument. The utility of the determination of an empirical quantity suitable for ordinary control purposes is contrasted with the value of fundamental measurements in terms of absolute quantities necessary for research and optimum control. Experimental results showing the typical behavior of the various types of testing instruments are given in a condensed form. The necessity of continuing the use of the present types of empirical devices are shown but emphasis is placed on the desirability of further development of absolute methods.

Cold Flow of Insulating Materials. Robert Burns and Irving L. Hopkins, Bell Telephone Laboratories, Inc.

Discusses the cold-flow phenomena (deformation as a result of pressure and time at elevated room temperatures) relating observed data with fundamental concepts utilizing the parallel-plate studies of Peek. Includes examples from practice illustrating the importance of cold flow in insulating materials, and a description of a device for accurate measurement of this property. Presents data on a wide variety of insulating materials. It is proposed that cold flow be considered as an important characteristic of organic materials, that this property be added to the proposed list for formal definition, and that a study of this paticular form of deformation be considered a proper activity of both organizations.

Measurements of Flow Characteristics of Plastics. H. L. Bender, H. F. Wakefield and H. E. Riley, Bakelite Corp.

The present status of the measurement of flow in resinous plastic masses is considered. Emphasis is placed on the methods of measurement for thermosetting products, since the permanently thermoplastic resins may be considered to fall within the same group of flow problems as the asphalts and cellulose derivatives.

The thermosetting resins are temporarily thermoplastic. Thus, change of flow is occurring during the period of flow measurement and test measurements are the resultants of very complex phenomena.

A résumé of the various methods used for determining the flow, for expressing the summation of the flow and hardening change with time, and for expressing the change of rate of flow with time are given. Some of the proposed, newer tests for heat hardening materials are discussed.

Tuesday, June 29 9:30 A.M. Third Session

Held Simultaneously with Second Session

Coal, Coke, Gaseous Fuels

Report of Committee D-3 on Gaseous Fuels. A. C. Fieldner, Chairman.

Progress report discussing considerations given by committee during the year to the need for and value of standardized procedures and test methods for gaseous fuels. Includes résumé of activities of subcommittees on correlation and measurement of gaseous samples, on calorific value of gaseous fuels, on specific gravity and density, on determination of impurities of gaseous fuels, on water vapor content, and on analysis of gaseous fuels.

Report of Committee D-5 on Coal and Coke. A. C. Fieldner, Chairman.

Presents new tentative methods of drop shatter test for coal and tumbler test for coal. Includes proposed revised tentative methods of test for grindability of coal by the ball-mill method and for grindability of coal by the Hardgrove-machine method. Presents tentative revision of standard method of sampling coal and the standard methods of laboratory sampling and analysis of coal and coke to provide a means for mechanical crushing and reduction of gross samples of coal. Recommends adoption as standard of existing tentative revision of standard methods of laboratory sampling and analysis of coal and coke. Discusses considerations being given by the committee to tests for agglutinating value, coal ash, fusibility, pulverizing characteristics and friability of coal; also mechanical sampling and reduction of sampling and on nomenclature and definitions.

Report of Sectional Committee M20 on Classification of Coals. A. C. Fieldner, Chairman.

Recommends revisions in and the adoption as standard of tentative specifications for classification of coals by rank and tentative specifications for classification of coals by grade. Reports briefly on considerations being given to studies of origin and composition of coal, boundry lines for coal classification, correlation of scientific classification with use classification, and on the size designation of coal.

Symposium on Significance of Tests of Coal and Coke

Pulverizer Performance as Affected by Grindability and Other Factors. Martin Frisch and A. C. Foster, Foster Wheeler Corp.

The various better-known methods proposed for determining "grindability" are compared, particularly the two methods adopted as tentative standards by the Society. The use of "grindability" in predicting mill performance is illustrated. Actual pulverizer performances are analyzed and the influence of "grindability" evaluated. The effect of initial moisture, initial coal size, and fineness of finished product on pulverizer performance are shown. The effects of these factors on pulverizer capacity is often greater than the effect of "grindability," and it is shown how pulverizer tests must be analyzed so that the effect of "grindability" on capacity be not masked by these other factors.

The Significance of Ash Softening Temperature and Ash Composition in the Utilization of Coal. A. W. Gauger, Pennsylvania State College.

The paucity of experimental data on the correlation of ash softening temperature measurements with clinker formation is pointed out. There is no general correlation between ash-softening temperature and clinker formation for the classes of utilization discussed, namely, underfeed stoker, pulverized fuel, domestic, water-gas generation. Little is known about the effects of ash composition, although the presence of iron oxide in the ash in excess of 20 per cent is held by some to be detrimental.

Interpretation of Laboratory Coal Tests, Proximate Analysis, and Calorific Value. G. B. Gould, Fuel Engineering Company of New York.

Behavior of coal is dependent on the combination of all its properties, and upon conditions of use under wide variety of conditions. Calorific value (B.t.u.) is the only laboratory test providing positive measure of its value as a fuel. The other items of the proximate analyses, moisture, ash, volatile and fixed carbon, relate to chemical or physical properties which affect its performance.

Tuesday, June 29 2 P.M. Fourth Session

Held Simultaneously with Fifth and Sixth Sessions

Symposium on Significance of Tests of Coal and Coke (continued)

The Significance to the Consumer of Sulfur in Coal. Henry Kreisinger, Combustion Engineering Corp.

Discusses the significance of sulfur in coal as viewed by the consumer who uses the coal as fuel for making steam. The consumer looks with disfavor on coals high in sulfur because the sulfur and the iron with which the sulfur is combined may cause much trouble (such as clinker, fouling, slagging, corrosion, objectionable odors, and they are subject to spontaneous combustion) and increase the cost of operating the boiler plant.

Laboratory Tests Relating to Caking, Plastic, Gas-, and Coke-Making Properties of Bituminous Coals. O. O. Malleis, Appalachian Coals, Inc.

Discusses volatile matter and agglutinating value tests for determination of caking properties; Layng-Hathorne, Adge-Damm, Davis Plastometer, and expansion tests with regard to plastic properties; laboratory distillation (tube) tests, BM-AGA carbonization tests, and box-coking tests with regard to high-temperature coking; and the Fischer assay tests with regard to low-temperature coking. Includes tabulations of results obtained by U. S. Bureau of Mines in their survey of coke- and gas-making properties of American coals, for correlation purposes.

Significance of Friability and Size Stability Tests on Coal. R. E. Gilmore, Fuel Research Labs., Department of Mines and Resources, Canada.

Discusses the significance of the "tumbler" and "drop shatter" tests for coal recently adopted by the Society. Outlines the development of these methods of test and reviews the relation of these to similar methods of test adopted some years ago for coke. Emphasizes the need and purpose of two friability test methods for coal and the adoption, in one of these, of the same shatter test machine as used for coke.

Significance of Tests of Coke from the Standpoint of Blast-Furnace and Cupola Utilization.

Tuesday, June 29 1:30 P.M. Fifth Session

Held Simultaneously with Fourth and Sixth Sessions

Paint and Related Products

Report of Committee D-1 on Paint, Varnish, Lacquer, and Related Products. Allen Rogers, Chairman.

Submits new tentative specifications for zinc sulfide magnesium pigment and titanium magnesium pigments, also extensive revision of specifications for basic sulfate white lead. Presents as tentative new methods of routine chemical analysis of zinc chromate yellow pigments, also completely revised methods of test for relative dry hiding power of white pigments and of paints. Recommends for immediate adoption revisions of standard methods of test for coarse particles, for routine analysis of titanium pigments and of dry red lead, and test for specific gravity of pigments. Presents for publication as tentative revisions in standard specifications for zinc sulfide, for zinc oxide methods of routine analysis of dry cuprous oxide, and test for the color characteristics of paints. Recommends adoption of tentative revision on standard methods of routine analysis of white linseed oil paints. Includes extensive report of investigations on tests for hiding power.

Symposium on Correlation Between Accelerated Laboratory Tests and Service Tests on Protective and Decorative Coatings

The paint industry needs to give more serious attention to providing quick laboratory methods for checking the service qualities of paint products. Both manufacturer and consumer would gain if composition might be relegated to a less important position than at present. The manufacturer would then have more freedom to use initiative in improving products purchased by specification and the consumer would benefit accordingly.

The development and proving in of quick laboratory service tests are in no sense simple matters. In the first place, we must know how the agents that act on films in service are likely to affect them under different conditions. This often requires studies of the most fundamental and involved type, for the films themselves are complicated physical and chemical systems which are subject to the different effects of innumerable variables in service. After this knowledge has enabled the chemist and physicist to piece together what seem to be logical testing procedures, the tests themselves must be proved in by patient checking against practical experience.

Many investigators have given attention to this subject during the past fifteen years and some progress has been made. This is particlarly true of the development of tests for interior wall paints and for finishes on metal surfaces. However, the quick evaluation of protective and decorative coatings for exterior service still presents many unanswered problems.

The Society's Committee D-1, through its various subcommittees, is studying the availability for use in specifications of the testing methods that have been suggested. In order to promote still further exchange of information, the committee is also sponsoring a special symposium at which all individuals and organizations who have been trying to use quick laboratory service tests are invited to describe and summarize the results of their work.

In making plans for this symposium, the committee in charge has found it necessary to limit the scope of topics that can be considered, but even so a sufficient amount of material has been included to promise appeal to those interested in a wide range of laboratory testing. It is the intention to make the symposium as informal as possible without the presentation of any formal papers and all discussion will be of limited length so as to permit expressions from as many individuals as possible. Also, throughout the entire program emphasis will be placed on the main purpose of the symposium, which is to bring out as much as possible of what is known about correlation between accelerated laboratory tests and service tests on protective and decorative coatings.

Topic I. Finishes for Indoor Service (Clear and Pigmented)
Leader—W. R. Fuller, Devoe & Raynolds Co., Inc.

Topic II. Paints for Exterior Service on Wood
Leader—H. A. Gardner, National Paint, Varnish and Lacquer Assn., Inc.

Topic III. Paints for Iron and Steel (Structural and Motive Service)
Leader—C. F. Rassweiler, E. I. duPont de Nemours and Co.

Tuesday, June 29 2 P.M. Sixth Session

Held Simultaneously with Fourth and Fifth Sessions

Bituminous Materials

Report of Committee D-8 on Bituminous Waterproofing and Roofing Materials. J. M. Weiss, Chairman.

Presents new tentative specifications covering asphalt for damp-proofing and waterproofing, and coal-tar pitch for roofing, damp-proofing and waterproofing to replace eight existing tentative specifications for these materials. Presents new tentative methods of test for sieve analysis of granular mineral surfacing for asphalt roofing and shingles, and for non-granular mineral surfacing for asphalt roofing and shingles. Submits revisions in the tentative specifications for asphalt roofing surfaced with powdered talc or mica, for asphalt shingles surfaced with coarse mineral granules, for asphalt for use in constructing built-up roof coverings, for asphalt roofing surfaced with fine mineral granules, for asphalt roofing surfaced with coarse mineral granules, for asphalt cap sheet surfaced with mineral granules, and for creosote for priming coat with coal-tar pitch in damp-proofing and waterproofing below and above ground level. Presents revisions in the tentative methods of test for coarse particles in mixtures of asphalt and mineral matter, and the general methods of testing surfaced asphalt roll-roofing and shingles. Presents for immediate adoption revisions in the standard methods of testing felted and woven fabrics saturated with bituminous substances for use in waterproofing and roofing. Includes reports on accelerated weathering tests of bituminous materials, on studies of bituminous emulsions to determine the resistivity of their dry films to water action and flow, and on results of cooperative test studies of methods for sieve analysis of granular mineral surfacing for asphalt roofing and shingles.

The Constitution of Cracked and Uncracked Asphalts. E. S. Hillman and B. Barnett, Shell Development Co.

Supplies chemical evidence supporting the conclusion drawn from the rheological properties of cracked asphalts that their greater degree of dispersion as compared with straight-run asphalt can be accounted for by the greater aromaticity of the maltenes. It is further shown that the components in low-level cracked asphalt have in all probability average molecular weights lower than that of the corresponding components in a straight-run residue. The chemical structure of asphaltenes is discussed together with the probability that they consist of a combination of units consisting of cyclic groups of probably no more than two or three rings condensed together.

Development of Internal Structure in Asphalts with Time. R. N. Traxler, The Barber Co., Inc., and C. E. Coombs, E. I. duPont de Nemours and Co.

The increase in consistency of asphalts with time (age-hardening) indicates the development of internal structure. This structure is developed more rapidly in air-blown than in steam- or vacuum-refined bitumens. It is wholly or partially eliminated by heating or mechanical working. The higher the rate at which internal structure develops, the more marked is the deviation from viscous flow. Asphalts with high rates of age-hardening and definite deviations from viscous flow give characteristic microscopic patterns when the surfaces are etched with ethyl ether or 86° Baumé naphtha.

Indentation and Compression Shear Tests for Determining Service Stability of Asphalt Plank. H. W. Greider and Henri Marc, The Philip Carey Manufacturing Co.

Discusses two methods for obtaining data on which to base prediction of the stability of asphalt plank under traffic. Gives data for eight samples of plank tested at three temperatures by both methods. Methods of determining temperature susceptibility from either McBurney indentation or compression shear data are presented. An equation has been found for calculating an index of temperature susceptibility from the indentation data. A combination of tests at three temperatures is suggested to insure stability and durability of plank in service.

Compression Testing of Asphalt Paving Mixtures. Roland Vokac, The Barber Co., Inc.

Continues the presentation of data and other supporting evidence on the subject opened in the last year's paper presented at the annual meeting at Atlantic City under the same title. Since the presentation of last year's paper we have compared various types of contemporary tests and determined their relative abilities to correlate with service behavior of mixtures as observed in the field. The compression test is shown to be the most reliable for predicting the success or failure of an asphaltic surface.

Design of Asphalt Mixtures for Underwater Construction. R. M. McCrone, U. S. Division Engineer Office, and F. C. Field, The Asphalt Inst.

Outlines progress in developing asphalt mixtures for mass construction above and below water for jetties on sand beaches. Discusses composition of mixtures, temperatures and placement and compaction methods to produce monolithic structures by combining flexible asphalt mats with precast side slope units of asphalt mixture to retain and weld with a central mass of asphalt mixture cast in place above or below water. Indicates precautions.

Wednesday, June 30 9:30 A.M. Seventh Session

Held Simultaneously with Eighth and Ninth Sessions

Road Materials, Bituminous Materials (continued)

Report of Committee D-4 on Road and Paving Materials. F. C. Lang, Chairman.

Recommends new tentative method of test for abrasion of coarse aggregate by use of the Los Angeles test machine. Submits new tentative specifications for standard size of coarse aggregates for highway construction to replace two existing specifications. Recommends immediate revisions in standard specifications for materials for cement mortar bed for brick, stone block, wood block, asphalt block and other block pavements. Presents revisions in tentative method of test for abrasion of gravel. Recommends adoption as standard of test for determination of amount of material finer than No. 200 sieve in aggregates to replace the two existing standard decantation test methods. Includes report of cooperative tests of subcommittee on solubility tests and presents as information proposed method of solubility test for asphalt road materials to determine the percentage present of sodium chloride or magnesium chloride.

A Critical Study of Road Tar Specifications. E. O. Rhodes and H. E. Gillander, Koppers Products Co.

Tars from several different sources were subjected to accelerated weathering, stability and wear tests. They also were analyzed in accordance with present standard, road tar specification methods. By comparing the results of the two methods of evaluation, certain deficiencies in present specifications and specification tests are indicated. In particular, the limitations of the present "total bitumen" test are pointed out and compared with tests which differentiate between tar-insoluble and solvent-insoluble materials. Present specification tests in use in the United States are compared with alternative methods employed abroad and relative suitabilities are discussed.

Emulsified Asphalt as a Soil Stabilizer. C. L. McKesson and V. E. Watts, American Bitumuls Co.

Describes research studies which led to the determination of the proper quantities of emulsified asphalt for different soils and also the proper selection of the grade of asphalt most suitable for use in the manufacture of the emulsified asphalt stabilizer. Discusses tests by which the efficiency of the stabilizer may be determined, also soil tests involved in the effective and economical design of stabilized soil mixtures, together with descriptions of apparatus now extensively used in these tests.

Research in Fillers for Brick Pavements. R. R. Litehiser, Ohio State Highway Testing Laboratory, and H. Z. Schofield, National Paving Brick Assn.

Describes the laboratory work which was done with the various fillers prior to their being used on a trial job under actual traffic, and presents the results of the first eighteen months' service.

Bituminous Practice on Western Highways. J. E. Buchanan, The Asphalt Inst.

Reviews the history of use of asphaltic materials. Discusses current practice in designing and constructing foundations, asphalt-surface treatments and asphalt pavements—roadmix, plantmix, penetration macadam and asphaltic concrete; and discusses present trends in Western bituminous practice.

The Constituents of Asphaltic Materials *versus* Accelerated Weathering. R. R. Thurston, The Texas Company.

Approximately 200 F. melting point asphalts prepared from Mexican, Gulf Coast, and Mid-Continent crude and a cracked residue have been separated into asphaltenes, resins and oils. Synthetic asphalts have been prepared by recombining these constituents in various proportions and from different sources. Accelerated weathering data were obtained on these materials. Results indicated an increased resistance to weathering when increased proportions of resins were used.

Wednesday, June 30 9:30 A.M. Eighth Session

Held Simultaneously with Seventh and Ninth Sessions

Masonry Materials, Refractories

Report of Committee C-3 on Brick. J. W. McBurney Chairman.

Recommends as tentative completely revised specifications for paving brick and for sewer brick to replace the existing standard specifications. Submits revisions in tentative specifications for clay or shale building brick. Recommends adoption as standard of tentative methods of testing brick to replace existing standard methods.

The Wick Test for Efflorescence of Building Brick. J. W. McBurney and D. E. Parsons, National Bureau of Standards.

Describes the wick test used at the National Bureau of Standards for estimating the tendency of clay bricks to contribute to efflorescence on masonry. The wick test consists in standing a whole brick on end in ½ in. of distilled water for 5 days and then drying in an oven at 105 to 110 C. The brick is thereafter compared with an unexposed specimen and the amount of efflorescence, determined by visual inspection, is reported on a scale consisting of 6 grades: none, trace, slight, moderate, considerable and abundant. The indications of the 5-day wick test correlated well with the grading for the masonry panels exposed to the weather when the individual bricks showed efflorescence in excess of the moderate grade in the wick test.

Report of Committee C-7 on Lime. James R. Withrow, Chairman.

Report of Committee C-11 on Gypsum. J. W. Ginder, Chairman.

Progress report discussing considerations being given by the committee to investigations of Keene's cement, the determination of time of set of gypsum neat plaster, and the ammonium acetate method of determining sand content of set plaster.

Report of Sectional Committee A42 on Specifications for Plastering. W. R. McCornack, Chairman.

Report of Committee C-8 on Refractories. J. D. Sullivan, Chairman.

Presents as tentative new methods of testing refractory brick, also extensively revised methods of chemical analysis of refractories. Recommends adoption as standard of tentative method of panel test for resistance to thermal and structural spalling of super duty fireclay brick, tentative definitions of terms relating to refractories, and the definition of super duty fireclay brick. Presents new tentative definitions relating to alumina diaspore refractories. Includes industrial survey of conditions surrounding refractory service in the glass industry.

The Celite Type High Temperature Thermal Conductivity Apparatus. C. E. Weinland, Johns-Manville Corp.

Describes the appartus and test method, as modified since their last description before the Society in 1928. A new method of constructing the heater plates is described. The cold-surface heaters and isothermal plates now used are treated in detail, as well as the new thermocouple arrangement. A power measuring circuit is shown.

The test method is designed to give results approximating the mathematical concept of conductivity rather than the integrated mean conductivity throughout a wide temperature interval.

Report of Committee C-10 on Hollow Masonry Building Units. D. E. Parsons, Chairman.

Presents new tentative specifications for non-load-bearing hollow concrete masonry units. Contains brief summary of general committee activities.

Report of Committee C-4 on Clay Pipe. Anson Marston, Vice-Chairman.

Brief progress report reviewing activities of the committee during the year.

Report of Committee C-18 on Natural Building Stones and Slate. W. M. Greig, Chairman.

Brief progress report reviewing the activities of the committee during the year.

Wednesday, June 30 9:30 A.M. Ninth Session

Held Simultaneously with Seventh and Eighth Sessions

Fatigue, Effect of Temperature

Report of Joint Research Committee of A.S.M.E. and A.S.T.M. on Effect of Temperature on the Properties of Metals. H. J. French, Chairman.

Progress report announcing reorganization of committee. Summarizes the various new sponsored research projects and work previously initiated which includes test studies of tubes at elevated temperatures, long-time creep tests on carbon steel K20, investigations of properties of metals at low temperatures, torsion creep tests for comparison with tension creep tests, relaxation tests, high-temperature life tests, effects of manufacturing variables on the creep resistance of steels, and plans for the assembly and interpretation of available creep test data. Presents revisions in the tentative method of test for high-temperature tension tests of metallic materials.

Includes reports on two investigations comprising, respectively, "Long-Time Creep Tests of 18 per cent Chromium, 8 per cent Nickel Steel and 0.35 per cent Carbon Steel," a sponsored research project carried out at Battelle Memorial Institute, and on "Discrepancies in the Load-Carrying Abilities of Carbon Steels at 850 F."

A Comparison of the Methods Used for Interpreting Creep Test Data. Joseph Marin, Rutgers University.

Discusses various methods of interpreting creep test data in tension for metals, for the purpose of obtaining working stress values. Compares methods used showing that there is in some cases considerable error in the final working stress values depending upon which method of interpretation is used.

New Equipment for Creep Tests at Elevated Temperatures. P. G. McVetty, Westinghouse Electric and Manufacturing Co.

Discusses fundamental creep test requirements. On account of actual variations among test specimens usually assumed to be alike, primary consideration is given to the need of several hundred simultaneous tests as a basis for statistical studies of creep characteristics. Creep-testing equipment with radical departures from conventional design has been developed. The first unit now in use for a year takes twelve 0.505-in. diameter specimens with a 20-in. gage length. Means have been provided to change to a 3-in gage length and make sixty simultaneous tests in the same furnace. Two similar units now being installed will allow sixty tests at each of three temperatures.

Relaxation of Copper at Normal and at Elevated Temperatures. John Boyd, Engineering Foundation.

Describes a method for simulating relaxation conditions in testing by means of an automatically controlled interrupted-creep test. Relaxation curves are shown for copper at room temperature and as high as 330 C. The experimental data illustrates the interdependence of such factors as stress, temperature, time and the amount of cold work. A short discussion on the correlation of relaxation findings with the results of creep tests is also included.

Report of Research Committee on Fatigue of Metals, H. F. Moore, Chairman.

Progress report presenting summary of current problems in the field of fatigue of metals and of interesting investigations in progress. Presents as information discussion of nomenclature in common use for various ranges in stress in fatigue.

A Fatigue Machine for Testing Metals at Elevated Temperatures. F. M. Howell and E. S. Howarth, Aluminum Company of America.

The specimen used in this machine is part of a cantilever beam, one end of which is fixed in the electrically heated furnace. While the specimen is entirely within the furnace, the deflected end of the beam assembly extends outside the furnace wall and is rotated in a circle by a variable eccentric driven at 3600 r.p.m. A unique calibration apparatus is used to load the specimen and to measure the resulting deflection while the machine is in operation. From the load-deflection relationship thus obtained, the stress in the test specimen can be calculated.

The method of temperature control is described. Specimen temperatures from room temperature to 600 F. can be controlled within ± 2 deg. Fahr.

Fatigue Properties at 3450 and 10,600 Cycles. T. T. Oberg and J. B. Johnson, Air Corps., U. S. A., Wright Field.

Describes a ball-bearing rotating-beam machine operating at 10,600 cycles and the results of comparative tests on these machines and ball bearing and plain bearing machines operating at 3450 and 1725 r.p.m. respectively. Plain and notched specimens are used and operating temperature discussed.

Wednesday, June 30 1:30 P.M. Tenth Session

Held Simultaneously with Eleventh Session

Steel, Wrought Iron, Metallography

Report of Committee A-2 on Wrought Iron. J. B. Young, Chairman.

Presents for publication as tentative proposed revision in process clauses of various specifications for wrought iron. Recommends tentative revisions in the standard specifications for staybolt wrought iron, solid; and for staybolt wrought iron, hollow rolled; and in the tentative specifications for single and double refined wrought-iron bars.

Report of Committee A-1 on Steel. H. H. Morgan, Chairman.

Includes seven proposed new tentative specifications covering the following: intermediate alloy seamless steel still tubes and heat-exchanger and condenser tubes; chromium-manganese-silicon alloy-steel plates, low-carbon-nickel steel plates, molybdenum steel plates, and carbon-silicon steel plates, for boilers and other pressure vessels; iron and steel filler metal (arc-welding electrodes and gas welding rods). Proposes adoption as standard of several tentative specifications covering the following: fabricated steel bar and rod mats and welded steel wire fabric, for concrete reinforcement; pipe flanges for general service; electric-resistance-welded boiler tubes; seamless low-carbon steel still tubes and cold-drawn heat-exchanger and condenser tubes. The list of specifications for steel suitable for fusion welding is recommended for withdrawal. Numerous revisions in several of the steel specifications are recommended.

Report of Research Committee on Yield Point of Structural Steel. M. O. Withey, Chairman.

Reports results of tests on series 351 which were undertaken to ascertain the effect of age on yield point of structural steel. Presents résumé of the various series of tests carried on by the committee up to the present time.

Steel Structures Identified and Flaws Located by Means of Balancing Wave Tests. Carl Kinsley, Consulting Engineer.

A balancing wave can establish a zero for the complete electromotive force induced in a testing circuit by a sample of any analysis, structure or physical condition. The appearance of another additional electromotive force in the testing circuit definitely shows that there has been some change in the specimen, but gives no information concerning its cause and significance. Micrographs made by the National Physical Laboratory illustrate some of the graphs and when the structure cannot be resolved by the microscope then electromagnetic measurements continue the significant record.

Weld Metal as an Engineering Material. L. J. Larson, A. O. Smith Corp.

Discusses the need for a knowledge of the properties of weld metal and the standard and special tests used for determining the desired properties. Compares the mechanical properties of bare wire welds in carbon steel with those of welds made with properly coated rods and indicates the relation between the properties of the weld metal and the chemical analysis and micro-structure. Also indicates the results that can be obtained in welding other ferrous alloys, both of the low alloy and the stainless types of steel.

A Fundamental Study of the Design of Impact Test Specimens. H. C. Mann, Watertown Arsenal.

Discusses the effect of length and form of notch on the energy values obtained from the tension-impact test. Presents data concerning the relation of energy to volume showing that between certain limits of length of notch the energy per unit volume is a constant, and that when the notch length is reduced, extreme values of energy concentration are obtained. Data are also presented which show that material embrittlement at low temperatures, as revealed by the impact test, is the result of two factors, velocity of impact and length of notch.

Report of Committee A-10 on Iron-Chromium, Iron-Chromium-Nickel and Related Alloys. Jerome Strauss, Chairman.

Brief progress report discussing considerations being given by the committee to the formulation of specifications for wrought and flat products, castings, and tubular goods. Announces active work underway on collection and classification of data and information on alloy steels under jurisdiction of committee. Reports considerations being given by committee to initiating exposure tests, to the desirability of obtaining information from inspections of existing installations of alloy steels and to the preparation of recommended procedures for corrosion testing.

Report of Committee E-4 on Metallography. J. T. Norton, Chairman.

Brief progress report discussing activities of the subcommittee on X-ray methods and special committee on grain characteristics of steel.

Wednesday, June 30 1:30 P.M. Eleventh Session

Held Simultaneously with Tenth Session

Petroleum Products, Electrical Insulating Materials, Rubber, Soap, Textiles

Report of Committee D-2 on Petroleum Products and Lubricants. T. A. Boyd, Chairman.

Presents as tentative new methods of test for kinematic viscosity by use of suspended level and modified Ostwald viscosimeters and table with equation for conversion of kinematic viscosity to Saybolt universal viscosity; also test for distillation of plant spray oils. Submits as information proposed methods of test for unsulfonated residue of plant spray oils, and for dropping point of lubricating greases. Includes revised methods of test for Reid vapor pressure of petroleum products comprising a consolidation of two existing tentative methods. Recommends revision in viscosity temperature chart for liquid petroleum products and in the test for knock characteristics of motor fuels. Submits for immediate adoption revisions in the standard methods of analysis of grease and test for melting point of paraffin wax. Includes detailed reports of subcommittees on turbine oils, plant spray oils, and natural gasoline.

Paper appended: "Method for Converting Kinematic to Saybolt Universal Viscosity," by C. E. Headington and J. C. Geniesse, The Atlantic Refining Co.

Report of Sectional Committee Z11 on Petroleum Products and Lubricants. T. A. Boyd, Chairman.

A Laboratory Channel Test for Gear Oils. J. P. Stewart, Socony-Vacuum Oil Co., Inc.

Describes axle channeling tests of a selected group of lubricants. Discusses the effect of aeration on the temperature at which oils channel and presents a laboratory channel test based upon the A.S.T.M. pour test with certain modifications necessary to incorporate aeration of the oil.

Report of Committee D-15 on Thermometers and Laboratory Glassware. W. H. Fulweiler, Chairman.

Brief progress report describing work of committee in reviewing existing requirements for glass apparatus and consideration given to requests from standing committees for specifications covering thermometers and laboratory glassware. Announces completion of detailed specification requirements for separate thermometers for the following tests: kinematic viscosity, acid heat, flash point by tag closed tester, and high softening point by ring-and-ball apparatus.

Report of Committee D-9 on Electrical Insulating Materials. T. Smith Taylor, Chairman.

Submits new tentative methods for the determination of insulation and volume resistance and approximate surface resistance of insulating materials as a revision of the existing standard methods. Presents revision in the existing tentative methods of test for solid filling and treating compounds used for electrical insulation; for sheet and plate materials used in electrical insulation; for varnished cloths and varnished cloth tapes used in electrical insulation; for flexible varnished tubing used for electrical insulation, and for shellac used for electrical insulation; also in the two tentative specifications for flexible varnished tubing and varnished cloth tape used in electrical insulation. Recommends adoption of tentative revision in the standard methods of testing molded materials used for electrical insulation. Submits for publication as tentative, revisions in the standard methods of testing electrical porcelain. Contains brief résumé of activities of subcommittees on insulating varnishes, molded materials, plates, tubes and rods, insulating mineral oils, ceramic products, insulating compounds, electrical tests, insulating papers and fabrics, mica products, and on conditioning. Includes statements concerning the significance of various tests for electrical insulating materials standardized by the committee.

Determination of the Edge Correction in the Measurement of Dielectric Constant. A. H. Scott, National Bureau of Standards.

Gives the results of measurement of dielectric constants using seven arrangements of circular electrodes, two methods of computation being used with two of the arrangements. Discusses the relative accuracy of these methods assuming the values obtained with the guard ring electrodes to be correct.

Report of Committee D-11 on Rubber Products. O. M. Hayden, Chairman.

Presents new tentative method for air pressure heat test of vulcanized rubber, and test for determining the resistance of soft vulcanized rubber and rubber-like materials to liquids. Submits revisions in two tentative specifications for insulated wire and cable covering respectively the class AO, 30 per cent hevea rubber compound and the performance rubber compound; also in the tentative methods of test for abrasion resistance of rubber compounds, and for compression set of vulcanized rubber. Recommends withdrawal of tentative specifications for class A, 30 per cent hevea rubber compound insulated wire and cable. Contains brief summary of activities of subcommittees, particularly those on insulated wire and cable, abrasion tests for rubber products, and tests of liquid rubber products.

Report of Committee D-13 on Textile Materials. H. J. Ball, Chairman.

Presents new tentative methods of test for wool felt, and methods of testing and tolerances for certain wool and part-wool fabrics. Presents for immediate adoption as standard extensively revised methods of testing and tolerances for tire fabrics other than cord fabrics to replace three existing standards. Recommends adoption as standard of revised methods of test for colorimetric determination of small amounts of copper and manganese in textiles. Submits revised method of test for volumetric determination of small amounts of copper in textiles. Submits revisions in tentative methods of testing and tolerances for rayon, general methods of test for properties of cotton fibers, methods of testing pile floor covering, and tentative definitions and terms relating to textile materials. Recommends adoption as standard with revisions of the tentative methods of test for fineness of wool, for fastness of dyed or printed cotton fabrics to laundering or domestic washing, and for fastness of dyed or printed silk or rayon fabrics to laundering or domestic washing. Submits for publication as tentative, revisions in standard general methods of testing woven textile fabrics, specifications for textile testing machines, general methods of testing and tolerances for cotton yarns and threads, specifications and methods of test for asbestos yarns, for asbestos tape for electrical purposes, and for asbestos roving for electrical purposes.

Report of Committee D-12 on Soaps and Detergents. H. P. Trevithick, Chairman.

First report of this committee outlining details of its organization to undertake work on soaps and detergents including materials entering into their manufacture. Presents new tentative specifications for milled toilet soap, for soda ash (anhydrous sodium carbonate) for caustic soda, for modified soda (sesquicarbonate type), and definitions of terms relating to soap. Presents as tentative extensive methods for the sampling and chemical analysis of soap and soap products covering the testing of cake, powdered, flake, liquid and paste soaps. Reports as information considerations being given by the committee to proposed methods of testing special detergents and to methods of analysis of sulfonated (sulfated) oils.

Wednesday, June 30 4:15 P.M. Twelfth Session

Edgar Marburg Lecture

The purpose of the Edgar Marburg Lecture is to have described at the annual meetings of the Society, by leaders in their respective fields, outstanding developments in the promotion of knowledge of engineering materials. Established as a means of emphasizing the importance of promoting knowledge of materials, the Lecture honors and perpetuates the memory of Edgar Marburg, first secretary of the Society.

Twelfth Edgar Marburg Lecture. "Plastics: Some Applications of the Different Classes—Methods of Testing," by Dr. T. Smith Taylor.

Discusses the properties of the different classes of plastics and particular applications of the same. Points out the advantages of certain materials for specific applications for both the thermoplastic and thermal setting materials. Summarizes the methods of testing now available and used for certain materials and indicates in definite instances the possibility of not making general application of approved methods of test to all materials. In this way it is shown that it will probably be necessary to develop specific methods of test for each class of materials in order to show their special properties. Attention is directed to the development of the test methods now in use and to the ways in which tests may be developed so as to apply to the materials for which the present tests are not suitable. Some consideration is given to the usefulness of test methods to both the producer and the consumer and to the significance of the tests to each of them.

Award of Charles B. Dudley Metal to W. H. Swanger and G. F. Wohlgemuth, National Bureau of Standards.

The Eleventh Award of the Charles B. Dudley Medal will be made to W. H. Swanger and G. F. Wohlgemuth, Senior Metallurgist and Associate Metallurgist, respectively, National Bureau of Standards, for their paper on "Failure of Heat-Treated Steel Wire in Cables of the Mt. Hope, R. I., Suspension Bridge," presented before the Society at the 1936 annual meeting.

Wednesday, June 30 8 P.M.

Round-Table Discussion on Impact Testing

Thursday, July 1 9:30 A.M. Thirteenth Session

Held Simultaneously with Fourteenth and Fifteenth Sessions

Timber and Naval Stores

Report of Committee D-17 on Naval Stores. F. P. Veitch, Chairman.

Presents two new tentative methods of test for acid number and for saponification number of rosin. Reports results submitted by eight cooperating laboratories on studies of tests for acid number and for saponification number of rosin resulting in the preparation of the proposed methods.

The Composition of Steam Distilled Wood Turpentine and Methods for Its Identification. T. C. Chadwick and S. Palkin, Bureau of Chemistry and Soils, U. S. Department of Agriculture.

Discusses the salient features which characterize steam-distilled wood turpentine. Shows physical data obtained by fractionation of this wood turpentine and qualitative examination of fractions, and proposes a method of testing the turpentine directly, without resort to fractionation, which involves a schematic treatment for the separation of aldehydes, phenols and terpene alcohols from the hydrocarbon portion, and the identification of benzaldehyde and fenchyl alcohol by way of derivatives.

Report of Committee D-7 on Timber. Hermann von Schrenk, Chairman.

Presents new tentative method of test for tar acids in creosote. Recommends adoption as standard of tentative specifications for timber piles and specifications for structural wood joist and plank, beams and stringers, and posts and timbers.

The Mechanical Properties of Balsa Wood. J. O. Draffin, University of Illinois, and C. W. Muhlenbruch, Aluminum Company of America.

Balsa is a light-weight wood used where lightness rather than strength is the determining factor. Tests are reported on bending, compression parallel and perpendicular to the grain and on column action. Laws have been found for the relationship between density and strength. Long-time bending tests show that beams will fail in three months at about two-thirds the load required to cause failure in short-time tests.

Report of Committee C-5 on Fire Tests of Materials and Construction. R. P. Miller, Chairman.

Brief progress report discussing work of the committee during the year. Presents as tentative new specifications for fire-retardant properties of wood for scaffolding and shoring.

Fire Tests of Doors for Buildings. A. S. Williams, Consulting Chemical Engineer.

Presents results obtained in over 50 fire tests of full-size door assemblies carried out in a specially constructed testing furnace which was provided with the necessary devices for the measurement and control of temperature, ventilation, smoke produced, etc. The types of doors tested included fire-retardant wood, metal clad and hollow metal construction.

Report of Committee D-10 on Shipping Containers. Edward Dahill, Chairman.

Thursday, July 1 9:30 A.M. Fourteenth Session

Held Simultaneously with Thirteenth and Fifteenth Sessions

Cement and Concrete

Report of Committee C-1 on Cement. P. H. Bates, Chairman.

Presents new tentative specifications for blended cements. Recommends for immediate adoption new standard specifications for natural cement. Presents as tentative new procedures for determining phosphorus and manganese in cement. Presents as information proposed procedure for making autoclave test for studying volume changes of portland cement. Includes detailed reports of working committees on fineness, plastic mortar tests, and methods of chemical analysis. Contains report of cement reference laboratory including extensive data from cooperative tests by a large number of laboratories on a sample of cement. Contains résumé of considerations being given by the committee to high-early-strength cements, masonry cements and portland cements, also to work on tests for fineness, volume change and soundness and the tests of additions to high-early-strength cement.

Tricalcium Aluminate and the Microstructure of Portland Cement Clinker. L. S. Brown, Lone Star Cement Corp.

Recognition of C_3A in portland cement clinker by microscopic examination has been found exceedingly difficult. To determine its mode of occurrence, that is, its relation to the structure of clinker, about 150 experimental burns were made, ranging from pure C_3A through high alumina silicate mixes into the field of portland cement compositions. The charges were examined in thin sections, especially prepared to yield optimum clarity.

Report of Committee C-9 on Concrete and Concrete Aggregates. R. W. Crum, Chairman.

Submits new tentative specifications for lightweight aggregate, and method of test for abrasion of coarse aggregate by use of the Los Angles test machine. Recommends for publication as tentative revisions in standard specifications for ready-mixed concrete, for curing portland-cement concrete slabs with calcium chloride admixture and for curing by surface application of calcium chloride; also in the method of making and storing compression test specimens of concrete in the field. Recommends adoption as standard of tentative method of test for voids in coarse aggregate for concrete (dry rodded), also test for determination of amount of material finer than No. 200 sieve in aggregates, the latter to replace the two existing standard decantation test methods. Presents revisions in the tentative methods of test for soundness of fine and coarse aggregate by use of sodium sulfate or magnesium sulfate. Includes an extensive report covering a study of plastic mortar cubes. Contains résumé of committee activities including discussion of admixtures for concrete.

Report of Committee C-13 on Concrete Pipe. E. F. Kelley, Chairman.

Presents revisions in and recommends adoption as standard of tentative specifications for reinforced-concrete culvert pipe. Contains brief summary of general committee activities.

Plastic Flow and Volume Changes of Concrete. R. E. Davis, H. E. Davis and E. H. Brown, University of California.

Discusses the findings of recent investigations of the plastic flow of concrete made at the University of California. These studies include: the effect of type of cement (composition and fineness) upon plastic flow; plastic flow in tension and compression under mass curing conditions; stresses developed during the heating-cooling cycle in mass concrete under conditions of complete axial restraint; and tests to determine the strains at various distances from the neutral axis of a plain concrete beam under sustained loading.

Effect of Freezing on the Permeability, Strength and Elasticity of Concrete and Mortars. H. H. Scofield, Cornell University.

The tests were undertaken to throw some light on the question as to the amount of injury concrete or mortar sustains when frozen before or during the setting period. Some of the mortars and concretes were frozen immediately after molding and others were frozen after normal setting periods of varying length. All of these were tested after subsequent normal curing periods of 7 days, 28 days, 1 yr. and 4 yr. Of those frozen immediately, the difference between short and long-time freezing is shown. The results show the effect on an ordinary portland cement, a high early strength portland cement, a high-aluminum cement, a waterproofed portland cement, and two brands of masonry cements.

Report of Joint Committee on Standard Specifications for Concrete and Reinforced Concrete. A. E. Lindau, Chairman.

An informal report of progress on the various activities of the committee.

Thursday, July 1 9:30 A.M. Fifteenth Session

Held Simultaneously with Thirteenth and Fourteenth Sessions

Corrosion

Report of Committee A-5 on Corrosion of Iron and Steel. F. F. Farnsworth, Chairman.

Submits as tentative specifications for farm-field and railroad right-of-way fencing and for barbed wire as revisions of existing standard specifications for these materials. Announces active work under way in the committee on the revision of existing specifications for strand, line wire, and chain-link fencing galvanized after weaving, and that new specification requirements for chain-link fencing galvanized before weaving are being studied. Reports results of latest inspections of atmospheric tests at Annapolis and the total immersion tests. Reports progress of outdoor exposure tests of bare and galvanized sheets and on metallic-coated hardware, structural shapes and tubular goods. Presents detailed report describing installation of material at eleven outdoor test locations in the comprehensive research program on corrosion of wire and wire products. Reports tests of physical and chemical properties of all materials exposed in wire test program now under way at National Bureau of Standards. Discusses considerations being given to accelerated tests for metallic coatings. Reports on cooperative studies of stripping methods for zinc coatings on irregular shaped articles.

Report of Sectional Committee G 8 on Specifications for Zinc Coating of Iron and Steel. J. A. Capp, Chairman.

Report of Committee B-3 on Corrosion of Non-Ferrous Metals and Alloys. T. S. Fuller, Chairman.

Brief progress report on activities of subcommittees studying the salt-spray test and the behavior of non-ferrous metals under atmospheric corrosion, and galvanic and electrolytic corrosion.

Corrosion Testing Methods for Copper Alloys. D. K. Crampton and N. W. Mitchell, Chase Brass and Copper Co.

Types of corrosion are discussed from the standpoint of *cause* and of *result*. The relation between the types of corrosion and corrosion test methods is considered also from the standpoint both of cause and of result. The essential features of the various corrosion test methods as carried out in the authors' laboratory are outlined. The accuracy, precision, interpretation, correlation, and use of the results obtained by the test methods are discussed. Actual test data are presented to illustrate the points brought out in the paper.

Discussion on Corrosion Testing Procedures.

This discussion is a continuation of that held in conjunction with the Chicago Regional Meeting of the Society on March 2 as a Symposium on Corrosion Testing Procedure. The program of that symposium consisted of the following papers:

The Principles of Corrosion Testing—C. W. Borgmann, National Tube Co., and R. B. Mears, Aluminum Company of America.

Atmospheric Testing—H. S. Rawdon, National Bureau of Standards.

Salt Spray Testing—E. H. Dix, Jr., and J. J. Bowman, Aluminum Company of America.

Alternate Immersion and Water-Line Tests—D. K. Crampton and N. D. Mitchell, Chase Brass and Copper Co.

Standardizing Liquid Corrosion Tests—R. J. McKay and F. L. LaQue, The International Nickel Co., Inc.

Soil Corrosion Testing—K. H. Logan, S. P. Ewing and I. A. Denison, National Bureau of Standards.

These papers, together with the discussion presented at the Chicago meeting, are being briefly summarized by Mr. L. W. Hopkins so as to present the principal points brought out at that meeting, in opening the discussion:

Corrosion Symposium Digest—L. W. Hopkins, American Chain Co.

Copies of this digest will be forwarded to all those interested in participating in the discussion.

Thursday, July 1 2:00 P.M. Sixteenth Session

Held Simultaneously with Seventeenth Session

Water

Report of Research Committee on Boiler Feedwater Studies. C. H. Fellows, Chairman.

Report of Committee D-19 on Water for Industrial Uses. Max Hecht, Chairman.

Brief progress report summarizing activities during the year of subcommittees on methods of sampling and analysis of industrial waters.

Technique in the Determination of Traces of Dissolved Oxygen. T. H. Daugherty, Hall Laboratories, Inc.

Discusses the need for determining extremely small concentrations of dissolved oxygen in plant waters, particularly those pertaining to boiler plants. The various modifications of the basic Winkler procedure appearing in the literature are considered from the standpoints of sensitivity, accuracy and practicability in the plant. The White evolution modification and the Schwartz and Gurney double-titration modification are the only two deemed to be adequately sensitive. The former is believed to be too complicated as it now stands for plant practice. The latter, with several recommended changes in procedure, is believed to be satisfactory, being simpler to operate and of comparable accuracy. Recommendations are made for further investigation of the electrometric titration and for further work in determining the limit of contaminants that can be tolerated in the sample.

The Need for pH Standards. S. F. Acree, National Bureau of Standards.

As pH test and control are in wide and important use in science, medicine and industry, there is an urgent demand that some responsible centralized agency undertake pH standardization and interpretation on a precision basis. This paper deals with various aspects of the problem now under way at the National Bureau of Standards and with a suggested program for the future work. Studies by the Bureau of the calibrations and over-all performance characteristics of apparatus such as vacuum tube pH meters and accessory glass and other electrodes are discussed.

Determination of Hardness in Water by Direct Titration. R. T. Sheen and C. A. Noll, W. H. & L. D. Betz.

Hardness in water may be determined by a direct titration with the potassium salt of certain fatty acids. Potassium stearate and potassium palmitate are found to be of value, the palmitate allowing the more accurate determination in the presence of interfering ions. Comparisons are given with the standard soap method on a number of samples, the results showing the palmitate method to be subject to less error.

Some Applications of the Polarizing Microscope to Water-Conditioning Problems. Everett P. Partridge, Hall Laboratories, Inc.

Discusses the polarizing microscope as a practical tool in the identification of substances deposited from water. Describes its use for general examination, measurement of optical properties and chemical-microscopic tests. Cites a number of interesting cases where the polarizing microscope supplied important information not available by chemical analysis in connection with samples of deposits from feed lines, boilers, superheaters and turbines.

A Thermodynamic and Colloidal Interpretation of the Published Studies on the Corrosion Cracking of Steel in Water Solutions. J. A. Tajc, Duquesne Light Co.

Shows by calculation that the phenomenon of corrosion cracking frequently referred to as "caustic embrittlement" cannot be explained solely on the basis of chemical and electrochemical principles. The theory of hydrogen embrittlement is refuted and a colloidal explanation is suggested.

Thursday, July 1 2:00 P.M. Seventeenth Session

Held Simultaneously with Sixteenth Session

Methods of Testing

Report of Sectional Committee Z23 on Sieves for Testing Purposes. L. T. Work, Chairman.

Report of Committee E-1 on Methods of Testing. W. H. Fulweiler, Chairman.

Progress report of committee activities discussing work of technical committees on mechanical testing, consistency and plasticity, particle size and shape, density, chemical composition, thickness measurement, interpretation and presentation of data, and designation and interpretation of numerical requirements. Includes report on study of method for determining yield strength when only a very slight tolerance of inelastic action is allowed.

Records completion of the recommended practices for designation of numerical requirements in standards and the distribution of copies to the standing committees of the Society with illustrative specifications showing suggested applications of the recommendations.

The Work of the Cement Reference Laboratory. J. R. Dwyer, National Bureau of Standards.

Reviews the principal activities to date of the Cement Reference Laboratory. Discusses the use of its inspection services by Government offices and those laboratories interested in performing inspection work under the supervision of those offices, cooperation extended by the laboratories, use of our reports within the inspected laboratories, and observed improvement in methods and apparatus as indicated by observations of the inspectors during the various tours.

Analysis of the Brinell Hardness Test. R. H. Heyer, Purdue University.

Reviews Meyer analysis and certain analytical and empirical treatments of ball-indentation tests. Describes a split specimen method for studying plastic flow of various ferrous and non-ferrous alloys under the Brinell ball, and proposes an explanation for the differences in the shapes of the hardness indentations. Gives data on required thickness of test specimens and on certain relationships between hardness characteristics and other physical properties. Proposes a method for determining a torsional yield strength.

Measuring Elastic Hysteresis. R. W. Carson, Instrument Specialties Co.

Spring elements in precision instruments may be subject to appreciable errors as the result of elastic hysteresis, or deviations in elastic deflections occurring with continued time under a constant load. To measure deviations as small as a millionth of an inch, a recording electronic micrometer was developed to measure deflections of elastic members without disturbing the load deflection. Typical records are included to show how hysteresis increases at a decreasing rate as long as the load remains. Test procedure is described for hysteresis measurements on flat-strip beam specimens and actual elastic elements used in instruments.

Improvement in Adaptability of the Tuckerman Strain Gage. L. A. Meisse, The Ohio Brass Co.

Discusses the qualifications of the Tuckerman optical strain gage for precise measurements. In order to improve the adaptability to measurements in inaccessible places adopter bodies are described. These adopters consist of specially constructed parallel flexure plates which transmit the movement from the specimen to the gage body. The broad use of similar flexure plate extensions on other types of strain gage is shown. The broadening of the applicability of strain gages to general displacement measurements widens their scope of usefulness in the testing laboratory.

Speed Control for Screw-Power Testing Machines Driven by Direct-Current Motors. A. H. Stang and L. R. Sweetman, National Bureau of Standards.

Describes a method for speed control of testing machines which have constant ratios of platen speed to motor speed. The method has been used to obtain definite speeds of platen travel not given by the gear shifts, to obtain very slow speeds for use in calibration and stress-strain determinations, and to obtain definite rates of stress increase in the specimen. It also can be used for maintaining a given load on a specimen for any desired time. It has been used for motors having a power rating as great as 15 hp.

Dynamic Tests by Means of Induced Vibrations. R. K. Bernhard, Consulting Engineer.

Describes the theoretical and practical applications of a method of dynamic testing. This method has been used since 1928 for all types of investigations ranging from tests on small laboratory specimens (axles and springs) to the heaviest battleship. The materials tested include steel, alloys, aluminum, reinforced concrete. All types of construction (riveted or welded trusses and girders) have been examined and compared by fatigue and aging tests. A few of the results, particularly various damping and amplifying factors of standard engineering systems, will be considered.

Thursday, July 1 Afternoon Open

Committee Meetings and Recreation

Golf Tournament

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Friday, July 2 9:30 A.M. Eighteenth Session

Held Simultaneously with Nineteenth Session

Cast Iron

Report of Committee A-3 on Cast Iron. W. H. Rother, Chairman.

Brief progress report discussing considerations being given to preparation of revisions in the existing tentative specifications for chilled-tread cast-iron wheels and for cast-iron culvert pipe.

Report of Committee A-7 on Malleable Iron Castings. E. K. Smith, Chairman.

Brief progress report on activities of subcommittees announcing completion of definition for malleable cast iron and of tentative specifications for cupola malleable iron; also that consideration is being given to galvanizing embrittlement and to preparation of specifications for pearlitic malleable iron.

The Tensile Strength of Cast Iron. J. O. Draffin and W. L. Collins, University of Illinois.

Studies of the effect on properties of surface conditions, of method of gripping ends, and of the removal of interior portions, are reported for test specimens of cast iron. Tests were made on machined and unmachined specimens and on specimens made with inside threads and with outside threads. Stress-strain curves from zero to failure are shown for solid and hollow specimens. Relatively little effect was produced by any of the variations. Efforts to apply and maintain an eccentric load on the test specimens were not entirely successful.

A Study of the Effect of Length of Span on the Transverse Test Results for Cast Iron. J. T. MacKenzie and C. K. Donoho, American Cast Iron Pipe Co.

Investigates the variation in results of transverse tests of cast iron caused by varying spans. Tests by previous investigators are discussed, as well as methods and results of new tests on rectangular bars of two different types of gray iron. By mathematical analysis of results, quantitative measure of the effect of changing span-depth ratio is developed for bars of both round and rectangular section.

Relation of Properties of Cast Iron to Thickness of Castings. H. L. Campbell, American Hoist and Derrick Co.

Presents data on the changes in the tensile and compressive strengths of cast iron in different sections. Results of other investigators are reviewed. Experimental test data are summarized on a chart which indicates the relation of the tensile strength of cast iron to the thickness of the cast sections. This characteristic of gray cast iron has special significance in the development of designs for iron castings.

A Proposed Standard Classification of Graphite in Gray Cast Iron. W. E. Mahin, Westinghouse Electric and Manufacturing Co., formerly with Vanadium Corporation of America, and J. W. Hamilton, Vanadium Corporation of America.

The need has been pointed out for a metallographic system of classification of the graphite phase in gray cast iron. Two proposed standard charts have been set forth. One of these in serving to identfy graphite flake size is similar to the A.S.T.M. grain-size chart for steels. The other represents four types of association of graphite flakes differing from each other in their distribution or orientation. A technique for the application of these two charts has been proposed, with emphasis laid on the use of suitable magnifications in order to produce a record representative of the entire area of the micro-section.

Report of Sectional Committee A21 on Specifications for Cast-Iron Pipe and Special Castings. T. H. Wiggin, Chairman.

Friday, July 2 9:30 A.M. Nineteenth Session

Held Simultaneousy with Eighteenth Session

Non-Ferrous Metals

Report of Committee B-1 on Copper and Copper Alloy Wires for Electrical Conductors. J. A. Capp, Chairman.

Recommends for immediate adoption changes in dimensional tolerances of the bottom lobe of standard sections for grooved trolley wire; also presents revisions in tentative specifications for hard-drawn copper alloy wires for electrical conductors. Calls attention to availability of bronze trolley wire having a minimum conductivity of 55 per cent and complying with the tensile strength requirements of class A bronze trolley wire.

Report of Committee B-2 on Non-Ferrous Metals and Alloys. R. F. Mehl, Chairman.

Recommends adoption as standard of revisions in the standard specifications for slab zinc (spelter), published since 1935 as a tentative revision. Submits as tentative completely revised specifications for rolled zinc which are intended to replace the existing standard specifications.

Fatigue Studies of Non-Ferrous Sheet Metals. C. H. Greenall and G. R. Gohn, Bell Telephone Laboratories, Inc.

This paper continues the work reported in a previous paper by J. R. Townsend and C. H. Greenall on "Fatigue Studies of Non-Ferrous Sheet Metals" appearing in the Society's *Proceedings*, Vol. 29, Part II, p. 353 (1929), and presents additional data on the fatigue characteristics of twenty-four non-ferrous sheet metals. Discusses the effect of grain size, heat treatment, surface finish and plated finishes on the fatigue properties of these metals.

Report of Committee B-4 on Electrical-Heating, Electrical-Resistance and Electric-Furnace Alloys. Dean Harvey, Chairman.

Recommends revision of definition of flexivity in tentative method of test for flexivity of thermoflex (thermostatic metals). Reports organization of new subcommittee to undertake preparation of methods of test for metallic materials used in radio tubes and related work on metals for incandescent lamps, which will include consideration of materials in the form of strip, wire, tubing, coated material, powdered materials and liquids. Reports arrangements for organization of new subcommittee to develop tests for durability of resistor alloys exposed to controlled atmospheres at high temperatures in electric furnaces. Reports progress on studies of life tests and electrical tests of resistance alloys and bend tests for wire.

The Stiffness or Flexure Test. H. L. MacBride, Tinius Olsen Testing Machine Co.

Discusses the test known as the cantilever bend, stiffness, or flexure test for light wire, strip, and sheet of various materials. A description of a stiffness testing machine is given and the procedure of test explained. Charts are shown of typical tests on metallic specimens with a brief interpretation of results. A graphic comparison is made of the stiffness test results with those obtained by other methods of test.

Report of Committee B-5 on Copper and Copper Alloys, Cast and Wrought. C. H. Mathewson, Chairman.

Presents new tentative specifications covering copper alloys manufactured in the form of seamless tubes for use in surface condensers, evaporators and heat exchangers, including admiralty metal, muntz metal, 70-30 brass, and copper-nickel alloys. The revised specifications represent a consolidation of four existing standards the withdrawal of which is recommended. Proposes revisions in tentative specifications for copper-silicon alloy wire for general purposes. Reports consideration being given to revised specifications for sheet and strip brass and for rolled non-ferrous bearing plates for bridges and other structural purposes.

Report of Committee B-6 on Die-Cast Metals and Alloys. J. R. Townsend, Chairman.

Presents revisions in three existing tentative specifications for alloy die castings covering, respectively, magnesium-base alloys, aluminum-base alloys, and zinc-base alloys. Announces extension of corrosion test program to include outdoor exposure tests on three zinc-base alloys and two magnesium-base alloys. Reports plans to undertake extensive series of tests on five lead and tin-base die-casting alloys to include determinations of tensile properties, long-time creep tests, impact, and hardness.

Papers appended:

"Brass Die Castings," by J. C. Fox, Doehler Die Casting Co.

"Effect of Die Design on the Properties of Zinc-Base Alloy Test Specimens," by G. L. Werley, The New Jersey Zinc Co.

Report of Committee B-7 on Light Metals and Alloys, Cast and Wrought. Sam Tour, Chairman.

Presents extensively revised specifications for aluminum-base sand-casting alloys in ingot form. Announces consideration being given to preparation of specifications for aluminum ingots for permanent mold castings as a companion standard to the tentative specifications for aluminum-base alloy permanent mold castings issued last year. Reports study being given to proposed specifications for aluminum alloy ingots for die castings. Includes résumé of subcommittee activities which include studies for obtaining information respecting the relative hardness of the various aluminum-base alloy castings and the aluminum-base alloy permanent mold castings. Reports work to be undertaken on survey of problems in connection with the production of the sand-cast test bars for testing aluminum-base alloys.

Report of Committee E-2 on Spectrographic Analysis. H. V. Churchill, Chairman.

Brief progress report discussing activities of committee during the year. Includes report of subcommittee on high purity metals and standards.

Report of Committee E-3 on Chemical Analysis of Metals. G. E. F. Lundell, Chairman.

Brief report of progress recording completion during the year of new tentative methods of chemical analysis of steel, cast iron, open-hearth iron and wrought iron. Announces organization of subcommittees for the preparation of revised and improved analytical procedures for non-ferrous metals and alloys.

Miscellaneous Business.

Interesting Meeting on Textile Materials

Professor Haven Honored

At the regular Spring Meeting of Committee D-13 on Textile Materials, held in Providence, R. I., March 10 to 12, there was a registration of 103 members and guests with excellent attendance at both the meeting of the main committee and of the 19 subcommittees. At the session devoted to technical papers there was held a Symposium on Atmospheric Conditions as Related to the Conditioning of Materials for Test.

The banquet was one of the main features of the meeting and this took the form of a testimonial to George B. Haven, Professor Emeritus of Advanced Machine Design, Massachusetts Institute of Technology, who was elected an honorary member of Committee D-13. Professor Haven has taken a very active part in the work of the committee and served as chairman from 1917 to 1920.

Among those present at the dinner were three members of the original committee, C. B. Finckel, H. J. Jaquith, and D. E. Douty. The latter served as toastmaster. Professor Haven was introduced by Russell T. Fisher, and in responding, he gave some delightful reminiscences of the earlier days, and suggestions for the future, particularly along the line of needed testing equipment. Holding up a copy of the A.S.T.M. Standards on Textile Materials, which contains the standards sponsored by Committee D-13, he said:

"There is a book founded on facts. Every rule in it has been developed by actual experience in the industry, based on careful investigation. If I were to suggest a slogan for your committee, it would be confined to one word,—honesty; for it is upon that one word that the future of the industry depends. The making of honest goods, and the presentation of honest descriptions of those goods in the merchandising, is the foundation upon which the textile industry of America must prosper."

Dean Walen, in presenting Professor Haven with a beautiful hand-engrossed scroll, contrasted the laboratory of 1915 with the present day laboratory. Accurately controlled temperature and humidity, extensive and accurate physical and microscopical equipment have replaced the crudely controlled and inaccurate devices of those days. He spoke highly of Professor Haven's contributions in bringing about this advancement, and also of his leadership in directing the discussion away from conflicts of interests and from expressions of opinions and personal animosities instead of facts to the present conduct of our meetings.

Professor Zenas R. Bliss, of Brown University, gave a very interesting talk on navigation of the yachts in the last international race off Newport, R. I.

The program of the papers session was as follows:

I. Importance of Atmospheric Conditions in the Testing of Textiles—
   - Introduction—by R. H. Brown, Parks-Cramer Co.
   - Importance of Atmospheric Conditions in Testing Textile Materials—by R. H. Adams, Cason J. Callaway Mills, Inc.
   - Importance of Atmospheric Conditions in Testing Wool—by A. G. Ashcroft, Alexander Smith & Sons Carpet Co.
   - Effect of Atmospheric Conditions in the Testing of Rayon—A. G. Scroggie, Rayon Department, E. I. duPont de Nemours & Co.
   - The Role of Atmospheric Conditions in the Testing of Asbestos Textiles—by David Wolochow, National Research Council of Canada.
   - The Mechanics of Moisture Absorption by Textiles—by A. C. Walker, Bell Telephone Laboratories.

II. Regain in Textile Materials—by R. H. Brown.
   - Discussion—by G. E. Hopkins, Bigelow-Sanford Carpet Co.; W. D. Appel, National Bureau of Standards; A. C. Clifford, Western Electric Co.

Recommendations on Standards

A number of recommendations resulting from the very active program of D-13 subcommittees were approved at the main committee for submission to letter ballot and subsequent reference to the Society for approval. Two new tentative standards were presented covering Test Methods for Wool Felt and Specifications and Methods of Test for Certain Wool and Part Wool Fabrics. Revisions were proposed in a number of existing standards including Standard General Methods of Testing and Tolerances for Cotton Yarns and Threads (D 180 - 36), Method of Estimating Hard Scoured Wool in Wool in the Grease (D 232 - 36), Methods of Testing and Tolerances for Woolen Yarns (D 403 - 36), Methods of Testing and Tolerances for Worsted Yarns (D 404 - 36), Methods of Test for Fineness of Wool (D 419 - 35 T), Methods of Testing Pile Floor Covering (D 418 - 36 T), Methods of Testing and Tolerances for Rayon (D 258 - 35 T), Definitions and Terms Relating to Textile Materials (D 123 - 36 T).

The following tentative standards, as revised, are to be recommended for advancement to standard: Methods of Test for Small Amounts of Copper and Manganese in Textiles (D 377 - 36 T), Method of Test for Fastness of Dyed or Printed Cotton Fabrics to Laundering or Domestic Washing (D 435 - 36 T), Method of Test for Fast-

Courtesy *Textile World*

Speakers' Table at D-13 Dinner—from left to right—G. B. Finckel, J. H. Lane and Co.; W. H. Cady, U. S. Finishing Co., President, Amer. Assn. Textile Chemists and Colorists; R. T. Fisher, Pres., Nat. Assn. Cotton Mfrs.; D. E. Douty, Pres., U. S. Testing Co.; Prof. Haven, Prof. Ball, E. D. Walen, Pacific Mills; Prof. Zenas Bliss, Brown Univ.; C. H. Clark, Secy., U. S. Inst. of Textile Research; H. J. Jacquith, Minot, Hooper and Co.

ness of Dyed or Printed Silk or Rayon Fabrics to Laundering or Domestic Washing (D 436 - 36 T).

CURRENT PROGRAM OF WORK

Included in the projects which are being carried on under the auspices of the committee are the following:

New methods for cotton fiber properties.
Device for measuring yardage of yarn or thread in a package.
Evenness standards for yarn and thread.
Moisture regain of cotton yarns and thread.
Strength test of heavily plied yarns.
Methods for determining sizing in gray and finished fabrics.
Twist determination of yarns from fabrics.
Calibration of horizontal testing machines.
Methods of testing spun rayon fabrics for wrinkling, bagging and stretching.
Methods of wool sampling and for scouring wool.
Machine for determining wool staple.
Methods of identification of hair fibers.
Specifications for yarns spun from wool mixed with other fibers.
Machine-wear test standardization and correlation with floor-wear tests on pile floor coverings.
Chemical tests for color durability of pile floor covering.
Specifications for 10-mil asbestos tapes.
Test for electrical resistivity of asbestos textiles.
Definitions of terms relating to leaf and bast fibers.
Test methods for jute, fiber length and strength of jute yarns, and numbering of jute yarns.
Method of classification of textile fabrics.
Development of a scientific system of fabric nomenclature.
Specifications for sheetings.
Method of rating results of tests on woven dress fabrics.
Methods for analysis of textiles containing tussah silk and lanitol.
Specifications for bursting testers.
Rate of loading on constant specimen-rate-of-load type testing machines.
Methods of testing for water-resistance, fastness to light, acidity and alkalinity.
Statistical analysis of precision of standards.

It was decided that the 1937 Fall Meeting of the committee would be held in New York City, October 20 to 22. This is to be featured by a Symposium on Testing Methods. At the March, 1938, meeting the committee plans to hold a Symposium on Textile Finishing Methods.

D. C. Scott, President, Henry L. Scott Co., was in charge of general arrangements for the meeting while the committee on arrangements for the dinner consisted of D. E. Douty, K. B. Cook, C. B. Finckel, H. J. Jaquith, D. C. Scott and W. H. Whitcomb.

Professor H. J. Ball, chairman of the committee, presided at the meetings.

Correction in Paper on Blast-Furnace Slag

THE attention of members is directed to an error appearing in the 1936 *Proceedings*, Part I, in the paper on "Studies on Relation Between Characteristics of Blast-Furnace Slag and Other Coarse Aggregates and the Properties of Resultant Concretes" by Fred Hubbard. In Table XIX, appearing on page 322, the loss in weight, per cent, for commercial slag No. 3 should be "1.2" instead of "12."

Discussion on Water Absorption of Building Brick

EDITOR'S NOTE.—The Austrian Society for Testing Materials, Mr. O. Hönigsberg, Secretary, has submitted discussions of a number of the papers presented at last year's annual meeting. One of these discussions by Dr. O. Drögsler deals with the paper on "Water Absorption of Building Brick" by J. W. McBurney. It is believed a number of members concerned with the problem of weather resistance of brick would find this discussion of interest and it is accordingly presented below.

IN HIS paper presented before the Society in 1935,[1] Mr. McBurney showed convincingly that the C/B ratio based on Hirschwald's saturation coefficient is a valuable means for determining the weather resistance of bricks. His extensive researches into the methods for determining the water absorption of bricks of as fundamentally different kinds as possible, as reported in his paper presented before the 1936 annual meeting,[2] are therefore all the more welcome.

In 1931 similar tests on 146 column-pressed, side-cut bricks of German standard size (25 by 12 by 6.5 cm.) were made at the Vienna Municipal Testing Laboratory for Building Materials. These bricks, tested in the form of cubes, had an average compressive strength of 250 kg. per sq.cm. and an average flexural strength of 50 kg. per sq. cm. The object of the examination was to determine the amount of water absorption after:

1. Twenty-four-hour immersion in water of about 20° C.,
2. Three-hour boiling and subsequent weighing in hot state,
3. Three-hour boiling and weighing in cold state after the boiling vessel with its contents had cooled down over night to about 20° C.

It was found that the water absorption amounted to:

1. (a) 21.79 per cent if the bricks had immediately been wholly immersed,
   (b) 22.53 per cent if they had been immersed gradually,
2. 23.79 per cent if they had been weighed in hot state, and
3. 25.32 per cent if the bricks had been weighed in cooled state.

These partial results agree with Mr. McBurney's comprehensive statements.

The statistical examination showed that the probable differences between the various methods of determining the same conditions is as follows:

1 (a) – 1 (b)	76.73 per cent
1 (a) – 2	96.33 per cent
1 (a) – 3	99.89 per cent
1 (b) – 2	95.99 per cent
1 (b) – 3	99.99 per cent
2 – 3	95.34 per cent

This throws some light on the certainty with which differences between the various methods of determining the water absorption may be expected.

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[1] The Relation of Freezing and Thawing Resistance to Physical Properties of Clay and Shale Building Brick by J. W. McBurney, *Proceedings*, Am. Soc. Testing Mats., Vol. 35, Part I, p. 247 (1935).

[2] Water Absorption of Building Brick by J. W. McBurney, *Proceedings*, Am. Soc. Testing Mats., Vol. 36, Part I, p. 260 (1936).

Joint Committee on Exposure Tests of Plating on the Non-Ferrous Metals

EDITOR'S NOTE: This is a progress report of the Joint Committee, submitted by William Blum, *Chairman,* National Bureau of Standards, Washington, D. C. The Committee is under the joint sponsorship of the American Electro-Platers' Society and A.S.T.M.

EXPOSURE tests of plated coatings on copper, brass, zinc, and die-castings, and also a few new sets on steel and iron, were started in the spring of 1936.[1] The results to date with the plated steel are consistent with the first series and do not warrant any detailed consideration at this time. This report is therefore confined to plating on non-ferrous metals on which most of the coatings are thinner than those on the steel—in accordance with commercial practice.

RESULTS OF INSPECTIONS

During the nine months exposure, four formal inspections were made at Key West, Fla., and three at each of the other five test locations. At the first inspection no numerical ratings were applied by the inspectors, who merely recorded the nature and relative extent of the defects observed. Study of these reports showed that the data could be at least roughly correlated with the same numerical scale as was used for iron and steel in the previous and present exposure tests. The only essential difference is that on iron and steel the rating refers solely to rust, while on the non-ferrous metals equal weight is given to any visible defects, including white or dark spots, tarnish, blistering and cracking.

The use of this scale in the subsequent inspections has yielded fairly consistent, though not entirely concordant results. For example, at a given inspection one or more inspectors may record lower ratings than do others for the same specimens, but in general all inspectors place the sets in the same order. The arithmetical average of all the ratings was taken for that set, and as there were five or more persons at almost every inspection, the average results were more consistent than were the individual ratings. It is believed that more discussion of the ratings at each inspection after they have been made independently will assist the inspectors to "calibrate" their rating scales.

One criterion of the validity of the averaged ratings is whether they decrease consistently at successive inspections, that is, correspond to increasing failure. A regular decrease in rating was observed in practically all the inspections. In those few cases in which the rating increased at one inspection, the discrepancy was less than one unit. This consistency of ratings with time shows that the ratings are not haphazard and that they have some quantitative value.

Another criterion of validity is whether the ratings place the sets in a regular order with respect to some pronounced variable such as thickness. In testing this point, consideration was given to the fact that, up to this time, at State College, Pa., and Washingon, D. C., almost all the sets are nearly perfect, that is, have ratings between 4 and 5, and in Pittsburgh, Pa., almost all the sets have a rating close to zero. Obviously, the results at these three test locations are of little value in making comparisons. Only the data from the other three test sites, namely Key West, Fla., New York, N. Y., and Sandy Hook, N. J., were therefore included in the compilations. It should be borne in mind that the present ratings represent simply the appearance of the uncleaned specimens and that cleaning may change the relative as well as the actual ratings. In general, it was found that the ratings increased with the thickness of nickel on copper, brass, zinc, and die-castings regardless of the method of plating.

[1] For details of tests see 1936 Report of Joint Committee, *Proceedings,* Am. Soc. Testing Mats., Vol. 36, Part I, p. 212 (1936).

USE OF COLOR PHOTOGRAPHY IN INSPECTIONS

In an effort to secure a permanent, objective record of the tarnish and corrosion, Mr. C. A. Vincent-Daviss took color photographs of many of the specimens in different locations. The results thus far obtained are only exploratory, as it was necessary to experiment with different types of film, illumination and exposure. The resultant pictures are a great improvement over black and white photography, as they record plainly the difference, for example, between superficial stains and actual corroded areas. They do not, however, reproduce closely the visual appearance of bright surfaces, which, in the pictures, have the color of the sky or other surface reflected in them. Further efforts will be made to improve and standardize the procedure so as to permit valid comparisons.

EFFECTS OF CLEANING AND OILING

Conclusions based only on visual inspections may be misleading, especially in industrial locations, where on many specimens dark surface films formed in a relatively short time. In general such failure was less rapid than on steel specimens with similar coatings of the same thickness. A few tests show that when these dark specimens were cleaned with a mild abrasive, the original bright surface of the chromium was almost completely restored, showing that the tarnish had spread from a few pores or cracks. It was also found that if to the cleaned surface, a light film of oil or grease was applied, it retarded corrosion and facilitated subsequent cleaning. At the meeting in Chicago, Ill., on March 2, it was recommended that further tests be conducted upon the effects of cleaning and greasing the surfaces, and also that some new specimens be plated with different methods of preparation, and exposed in supplementary tests. Pending the conclusion of such tests, no detailed conclusions will be drawn or reported.

Comparative Tests of Cement

THERE has been distributed to the members of the A.S.T.M. Committee C-1 on Cement a report of the results of comparative tests made on a sample of cement distributed some months ago by the Cement Reference Laboratory at the National Bureau of Standards. The tests were intended not only to afford information to the participating laboratories but to secure, particularly from participants, such discussion as might indicate whether comparative tests of a briefer nature, performed at intervals and reported quickly upon receipt of the various reports, would be desirable. A study of the report indicates that the results were possibly in closer accord than any previous series of tests among such a large number of laboratories. Details of the tests are to appear in the 1937 annual report of Committee C-1.

Problems

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Five men are engaged in a poker game—Brown, Perkins, Turner, Jones and Reilly. Their brands of cigarettes are Luckies, Camels, Raleighs, Old Golds and Chesterfields, but not respectively.

At the beginning of the game the number of cigarettes possessed by each of the players was 20, 15, 8, 6 and 3, but not respectively.

Later in the evening at a given time, the following conditions obtained:

1. Perkins asks for three cards.
2. Reilly has smoked half his original supply, or one less than Turner.
3. The Chesterfield man originally had as many more, half as many more, and 2½ more cigarettes than he now has.
4. The man who draws to an inside straight absent-mindedly lights the tipped end of his fifth cigarette.
5. The man who smokes Luckies has smoked two more than anyone else, including Perkins.
6. Brown drew as many aces as he had cigarettes.
7. No one has smoked all his cigarettes.
8. The Camel man asks Jones to pass Brown's matches.

Problem: How many cigarettes did each man have originally and what was each man's brand?

Answers will be given in July BULLETIN.

Data Manual Reprinted

SINCE it was originally issued in 1933, the Manual on Presentation of Data has been widely distributed and the two Supplements covering additional material issued in 1935 have likewise been widely used. This use of the Manual and Supplements has indicated the desirability of combining the material in one volume. This reprint has now become available and includes amplifications in certain parts of the text.

The reprint includes the original manual, supplement A, presenting plus or minus limits of uncertainty of an observed average, and supplement B, covering control chart method of analyzing data. The material in the publication has been prepared under the direction of a special committee, of the Technical Committee on Interpretation and Presentation of Data, headed by H. F. Dodge, and including as members Messrs. W. C. Chancellor, J. T. MacKenzie and R. T. Webster.

Four general aspects of any problem involving the use of data are (1) statement of problem; (2) collection of information; (3) interpretation; and (4) presentation. While the Manual deals specifically with the fourth item, it does discuss reasons why this problem cannot be isolated and treated independently of the problems of collection and interpretation.

The new reprint, including tables of squares and square roots, comprises 73 pages and is bound in heavy paper cover. Copies can be obtained by members at the special price of 65 cents. The list price is 85 cents per copy.

Latest Index to Proceedings Completed

THE Index to *Proceedings*, Volumes 31 to 35 inclusive, has been published and members who ordered copies should by now have received them. This Index covers the contents of the *Proceedings* for the years 1931 through 1935 and should be of invaluable service to any of the members who have occasion to refer to specific subjects included in these volumes. All papers and committee reports are fully indexed under appropriate keywords and the listings have not been restricted to words in the titles but have been indexed under a number of subjects to which they apply. A large number of cross references to other subjects that are related to the respective topics are given.

A complete author index is also given and includes the authors of discussions as well as those who presented technical papers.

The Index (194 pages) has been printed in double column style which improves its readability. Copies can be obtained by members at the special price of $1.50 in cloth binding; $2.25 in half leather. The non-members' prices are $2.25 and $3 respectively.

This is the fifth of the *Proceedings* Indexes to be issued, the previous four covering the *Proceedings* from Volumes I through 30 (1898-1930). A special price has been made for a complete set of five indexes and members can obtain this complete set at $5 in cloth or $8.50 in half leather.

An order blank is enclosed with this BULLETIN for the convenience of members who may wish to order copies.

Institute of Physics Information Service

THE American Institute of Physics is planning to keep an up-to-date file of men and women trained in various branches of physics who may be available for employment in industry—the list to be classified according to university degrees and also with respect to special interest. In the latter classification the subjects listed include theoretical physics, atomic physics, chemical physics, electronics, optics, acoustics, spectroscopy, X-rays, electrical research, instrument design and rheology. With this file the Institute will be able to supply upon request the names of persons especially fitted for particular service. No charge to the applicant or to the employer is made for the service. Information concerning this service can be obtained by writing the Institute, 175 Fifth Ave., New York City.

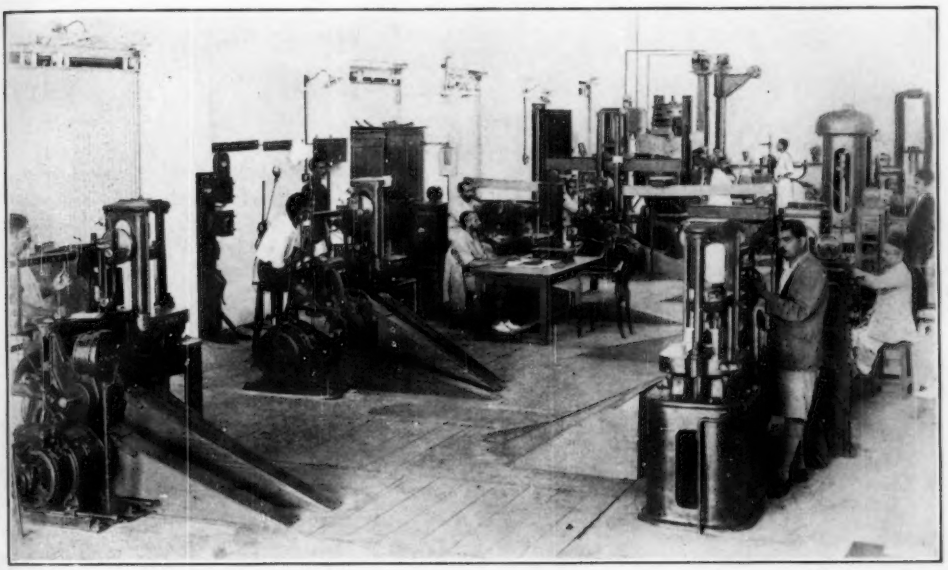
Playground—Chrystie, Canal and Forsythe Streets, New York City

Far-Distant Members

EDITOR'S NOTE.—Believing that articles and photographs relating to members of the Society who are located at far-distant points would be of interest, we recently asked a number of our members in various sections of the world if they would send us information which could be used in the BULLETIN. The accompanying article dealing with the Forest Research Institute at Dehra Dun, India, is the first received.

THE Forest Research Institute, at Dehra Dun, India, has been a member of the Society since 1921. At the present time, Mr. V. D. Limaye is officer in charge of the Timber Testing Section. After receiving his degree in engineering from Poona Engineering College, Mr. Limaye worked as a designer of structures, was lecturer in applied mechanics and materials testing at Poona, and later was Assistant in the Timber Testing Section at the Forest Research Institute at Dehra Dun. The Government of India deputed him for advance training in forest research laboratories in other countries, and he worked in the laboratories of Princes Risborough, England, at Ottawa and Madison, and also visited the laboratories at Vancouver, Manilla, and Kaula Lumpur (F.M.S.).

The Timber Testing Laboratory at Dehra Dun, shown in the accompanying photograph, was started in 1920 by the Government of India for a scientific determination of the properties of Indian timbers. It is equipped with sixteen testing machines of various makes and capacities, and can test specimens from small aircraft material to big beams of 6 by 12-in. section or more, and poles of 20 ft. length. Work is carried on under definite projects of research and about 150 different species of Indian timbers have so far been tested. The testing is done according to the recognized methods of timber testing, and the results, published in the "Physical and Mechanical Properties of Woods Grown in India," are strictly comparable with those obtained in other laboratories from similar tests.



Timber Testing Laboratory at Dehra Dun, India

V. D. Limaye

Catalogs and Folders Received

A. DAIGGER AND CO., 159 W. Kinzie St., Chicago, Ill.—Catalog covering supplies and chemicals for chemical, clinical, metallurgical and science laboratories. This list forms all standard equipment and that of special design for which there is general demand. Highly specialized equipment is covered by separate pamphlets available from the company. The numerous illustrations show either a standard type of apparatus or a characteristic feature which may be adapted to particular requirements. 454 pages.

THE BRISTOL CO., Waterbury, Conn.—A loose-leaf binder complete with numerous special catalogs and folders covering equipment produced by the company such as flowmeters, gages, pyrometers, hydrometers, recording meters, temperature controllers, telemeters, valves, etc.

ACE GLASS, INCORPORATED, Vineland, N. J.—Catalog of laboratory apparatus with interchangeable ground glass connections. These connections are produced by special methods developed by the company. Catalog is conveniently arranged for filing, in wire binding. 135 pages.

BAUSCH AND LOMB OPTICAL CO., 636 St. Paul St., Rochester, N. Y.—Catalog D-185 covering laboratory microscopes and accessories. 20 pages.

AMTHOR TESTING INSTRUMENT CO., 4-10 Leo Place, Brooklyn, N. Y.—Folder consisting of special circulars covering the Amthor laboratory and industrial instruments for use in connection with such products as paper, cordage, etc. Also covers various gages, tachometers, tensile strength testers and the like.

BUFFALO APPARATUS CORP., 180 Main St., Buffalo, N. Y.—Catalog covers laboratory equipment for chemical, biological and metallurgical laboratories. General arrangement is alphabetical. 478 pages devoted to equipment—the chemical index covers some 90 pages.

Calendar of Society Meetings

(Arranged in Chronological Order)

AMERICAN INSTITUTE OF CHEMICAL ENGINEERS—May 26-28, Royal York Hotel, Toronto, Canada.

AMERICAN SOCIETY OF REFRIGERATING ENGINEERS—June 1-3, French Lick Hotel, French Lick Springs, Ind.

AMERICAN WATER WORKS ASSN.—Annual Convention, June 7-11, Hotel Statler, Buffalo, N. Y.

AMERICAN ELECTRO-PLATERS' SOCIETY—June 14-17, New York City.

ENGINEERING INSTITUTE OF CANADA—Semi-Centennial Celebration, June 15-17, Windsor Hotel, Montreal, Canada.

ASSOCIATION OF AMERICAN RAILROADS, MECHANICAL DIVISION—Annual Meeting, June 16-23, Municipal Auditorium, Atlantic City.

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS—Summer Convention, June 21-25, Milwaukee, Wis.

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE—June 21-26, Denver, Colo.

AMERICAN SOCIETY OF HEATING AND VENTILATING ENGINEERS—Semi-Annual Meeting, June 24-26, New Ocean House, Swampscott, Mass.

SOCIETY FOR THE PROMOTION OF ENGINEERING EDUCATION—Annual Meeting, June 28-July 2, Cambridge, Mass.

AMERICAN SOCIETY OF CIVIL ENGINEERS—Annual Convention, July 21-23, Detroit, Mich.

AMERICAN CHEMICAL SOCIETY—September 6-10, Rochester, N. Y.

AMERICAN TRANSIT ASSN.—Annual Convention, September 19-23, The Greenbrier Hotel, White Sulphur Springs, W. Va.

ASSOCIATION OF IRON AND STEEL ENGINEERS—September 26-October 1, Chicago, Ill.

AMERICAN SOCIETY OF MUNICIPAL ENGINEERS—October 4-6, Atlanta, Ga.

TECHNICAL ASSOCIATION OF THE PULP AND PAPER INDUSTRY—Fall Convention, October 18-20, De Sota Hotel, Savannah, Ga.

NEW MEMBERS TO APRIL 21, 1937

The following 52 members were elected from March 15 to April 20, 1937:

Company Members (7)

DELUXE PRODUCTS CORP., THE, L. B. Boyd, Vice-President, La Porte, Ind.

HILLS-MCCANNA CO., D. W. Moll, Vice-President, 2349 Nelson St., Chicago, Ill.

JESSOP STEEL CO., R. E. Malmberg, Chief Metallurgist, Green St., Washington, Pa.

MAC-LAC CO., INC., THE, W. J. McIntosh, Chemist, 80 Cliff St., New York City.

MARYLAND GLASS CORP., W. R. Lester, Chief Chemist, Morrell Station, Baltimore, Md.

TUBIZE CHATILLON CORP., N. B. Richardson, Sales Service, 2 Park Ave., New York City.

WHITALL TATUM CO., J. L. Bacon, Secretary, Millville, N. J.

Individual and Other Members (40)

AINSWORTH, A. W., Manager, Tool and Alloy Steel Division, Horace T. Potts Co., E. Erie Ave., and D St., Philadelphia, Pa.

AMUNDSEN, P. L., Chemical Engineer, Parker-Wolverine Co., Detroit, Mich. For mail: 14060 Archdale, Detroit, Mich.

AURORA, CITY OF, ENGINEERING DEPT., T. M. Berg, City Engineer, Aurora, Ill.

BAKER, E. M., Professor, Department of Chemical Engineering, University of Michigan, Ann Arbor, Mich.

BELL, J. E., Technical Director, Cleveland Cloth Mills, 711 W. Marion St., Shelby, N. C.

CARLSON, T. A., Senior Engineer, Forest Products Laboratory, Madison, Wis.

CLINGERMAN, R. L., Consulting Engineer, The William Bayley Co., Springfield, Ohio. For mail: 3701 Massachusetts Ave., N. W., Washington, D. C.

EVANS, W. A., Telephone Engineer, Bell Telephone Laboratories, Inc., 463 West St., New York City.

FLINT, F. C., Chief Chemist, Hazel-Atlas Glass Co., Zanesville, Ohio.

FORREST, G., Technical Assistant in charge of Physical Testing, Northern Aluminum Co., Ltd., Banbury, Oxfordshire, England.

GOLDTHWAIT, J. A., Director of Technical Research, U. S. Finishing Co., 400 Charles St., Providence, R. I.

GREENE, J. F., Chemical Engineer, Kimble Glass Co., Vineland, N. J. For mail: 1123 Pear St., Vineland, N. J.

GUNN, F. R., President, Frank R. Gunn Co., Ontario and Brabant Sts., Philadelphia, Pa.

IRONS, J. D., Assistant Metallurgist, Navy Yard, Portsmouth, N. H.

JESTER, M. B., Chief Chemist, Calumet Refining Co., 4323 S. Western Boulevard, Chicago, Ill.

JOST, E. B., General Superintendent of Canals, Department of Transport, West Block, Ottawa, Ont., Canada.

KING, H. R., Metallurgist, Jenkins Bros., 510 Main St., Bridgeport, Conn.

KOEHRING, R. P., Metallurgist, Moraine Products Division, General Motors Corp., Dayton, Ohio.

LABARRE, R. V., Foundation Engineering, 262 Chamber of Commerce Building, Los Angeles, Calif.

LOUGHLIN, W. D., President, Boonton Radio Corp., Boonton, N. J.

MCQUADE, J. D., Superintendent, Kemet Laboratories Co., Inc., Box 6087, Cleveland, Ohio.

MEIN, W. W., JR., Sales and Research Dept., Calaveras Cement Co., 315 Montgomery St., San Francisco, Calif.

PETERSON, C. E., City Engineer, City Hall, Kansas City, Kans.

REINHOLD, B., President, Abegg & Reinhold Co., 2533 E. Twenty-sixth St., Los Angeles, Calif.

SAN DIEGO, CITY OF, DEPARTMENT OF WEIGHTS AND MEASURES, Court House, San Diego, Calif.

SANDELL, B. E., Metallurgist and Chief Chemist, Stewart Die Casting Corp., 4535 Fullerton Ave., Chicago, Ill.

SMITH, ARTHUR R., Development Engineer, Moulding-Brownell Corp., 155 W. Wacker Drive, Chicago, Ill.

SPRINGFIELD, CITY OF, DEPARTMENT OF STREETS AND ENGINEERING, Asphalt Laboratory, 306 Taylor St., Springfield, Mass.

STALLER, A. W., Factory Manager, Crescent Insulated Wire and Cable Co., Trenton, N. J.

STOCKER, R. N., Material Inspection Dept., Hygrade Sylvania Corp., Loring Ave., Salem, Mass.

STOLZENBACH, W. F., President and General Manager, National Mortar and Supply Co., 1520 Grant Building, Pittsburgh, Pa.

TAYLOR, W. A., President, W. A. Taylor and Co., Inc., 872 Linden Ave., Baltimore, Md.

TEETOR, M. O., Research Engineering, The Perfect Circle Co., Hagerstown, Ind. For mail: 707 Cherry St., Newcastle, Ind.

TURNER, C. H., Principal Engineer, Pullman-Standard Car Manufacturing Co., 27 Mountain St. West, Worcester, Mass.

UNIVERSITY OF NEW MEXICO, College of Engineering, M. E. Farris, Dean, College of Engineering, Albuquerque, N. Mex.

WAMPLER, R. W., Research Chemist, Libbey-Owens-Ford Glass Co., Toledo, Ohio.

WAYNE COUNTY ROAD COMMISSION, W. J. Worth, Testing Engineer, 33809 Michigan Ave., Wayne, Mich.

WEBSTER, R. A., Process Engineer, Douglas Aircraft Co., Inc., Santa Monica, Calif.

WENDEL, O. G., Mechanical Engineer, American Radiator Co., Non-Ferrous Division, 2050 Elmwood Ave., Buffalo, N. Y.

WINFREE, W. W., Assistant to Vice-President, Glamorgan Pipe and Foundry Co., Langhorne Road, Lynchburg, Va.

Junior Members (5)

CASSIDY, R. G., Chief Chemist, Filmite Oil Corp., 4400 W. Monarch Place, Milwaukee, Wis.

MEYERS W. D., JR., Chief Chemist, West Bank Oil Terminal, 213 S. Broad St., Philadelphia, Pa.

PIZZIRANI, D. A., 135 W. Tenth St., New York City.

PORTER, W. J., Aggregate and Concrete Technician, Perkins Gravel Co., Sacramento, Calif. For mail: 4020 Sonoma Ave., Sacramento, Calif.

RUF, ALBERT, 209 E. Fifty-third St., New York City.

NECROLOGY

We announce with regret the death of the following members and representatives:

WILLIAM C. CHANCELLOR, Superintendent, Metallurgical Dept., Lorain Works, National Tube Co., Lorain, Ohio. Member since 1934. Mr. Chancellor was a special adviser of the Subcommittee on Presentation of Data of Committee E-1 on Methods of Testing.

W. H. FRASER, General Manager, Mexican Light and Power Co., Ltd., Bis., Mexico, D. F., Mexico.

WALTER F. KERN, Chief Chemist, Nazareth Cement Co., Nazareth, Pa. Member since 1925.

FREDERICK C. LANGENBERG, Consulting Engineer for U. S. War Dept.; Vice-President in Charge of Research, Engineering and Development, United States Pipe and Foundry Co., Burlington, N. J. Member since 1920. Doctor Langenberg participated very actively in the work of the Joint Committee on Investigations of Effect of Phosphorus and Sulfur in Steel while he was Metallurgist at Watertown Arsenal. He represented his company on Committee A-3 on Cast Iron and was chairman of Subcommittee I on Pig Iron. He also represented the Society on the Joint Research Committee on Pig Iron Qualities. From 1927 to 1929 Doctor Langenberg served as a member of the Society's Executive Committee.

FRANK PIERACCINI, In Charge of Fabric Division, Product Development Dept., The Fisk Rubber Corp., Chicopee Falls, Mass. Member since 1933. Mr. Pieraccini was for several years a member of Committee D-13 on Textile Materials.

H. T. TERRELL, Assistant Manager, Development Division, Manufacturing Dept., Sun Oil Company, Marcus Hook, Pa. Member since 1936. Mr. Terrell held membership on Committee D-2 on Petroleum Products and Lubricants and represented his company on Committee D-9 on Electrical Insulating Materials.

Errata Notice—Petroleum Oils Volume Correction Table

ATTENTION is called to two additional typographical errors in the Standard Abridged Volume Correction Table for Petroleum Oils (D 206 - 36). In the table for Group 0, for an observed temperature, *t*, of 137 F. the correct multiplier, M, is 0.9735. It is incorrectly printed as 0.9736. Also, in the table for Group 5, for an observed temperature of 110 F. the correct multiplier, M, is 0.9594. It is incorrectly printed as 0.9592. These corrections should be noted in the 1936 Book of A.S.T.M. Standards, Part II, pages 989, 994; also, in the compilation of "A.S.T.M. Standards on Petroleum Products and Lubricants," pages 331, 336, September, 1936.